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United States
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Forest Health Technology Enterprise Team



Forest Service

Forest Health Protection

**Forest Health Enterprise
Team—Fort Collins**

3825 East Mulberry St.
Fort Collins, Colorado
80524

FHTET 95-1

February 1996



Program of Work - FY 1996

**United States
Department of
Agriculture**



National Agricultural Library

USDA FOREST SERVICE FOREST HEALTH TECHNOLOGY ENTERPRISE TEAM

PROGRAM OF WORK - FY96

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FEBRUARY 1996

FOREWORD

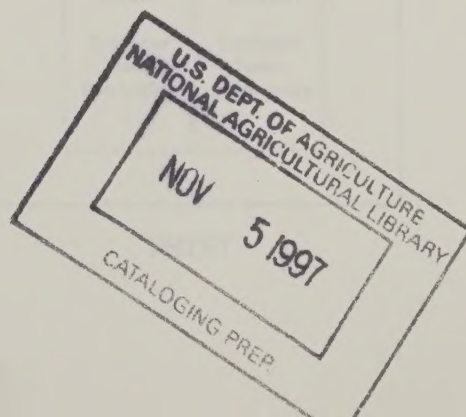
This document outlines the work to be undertaken by the USDA Forest Service's Forest Health Technology Enterprise Team (FHTET) during Fiscal Year 1996 (FY96). The FHTET comprises three offices, located in Morgantown, West Virginia; Fort Collins, Colorado; and Davis, California. The document is a compilation of tasks from all three offices. This is the first FHTET plan of work, and we encourage your comments and suggestions for subsequent years' plan of work.

This document lists tasks that are to be completed in FY96, tasks to be completed in subsequent fiscal years, and ongoing tasks. The document serves as a planning tool. Tasks and budgets may be amended based on actual funds available, personnel available, changing and emerging priorities, and other, unforeseen factors.

This document was prepared by staff in the FHTET-Fort Collins (FHTET-FC) office.

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USDA FOREST SERVICE

FOREST HEALTH TECHNOLOGY ENTERPRISE TEAM

MISSION

To provide technologies to support the health of America's forests.

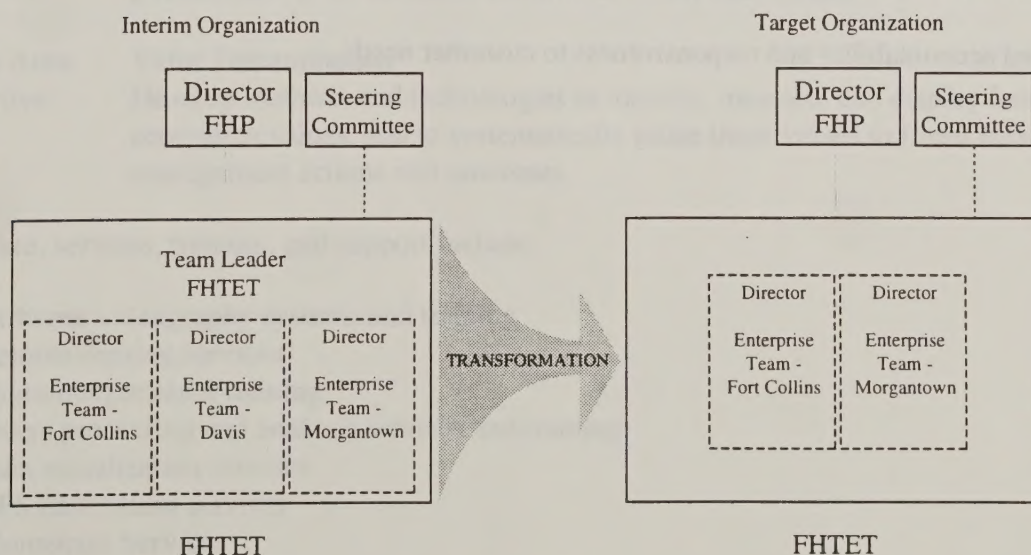
BACKGROUND

Historically, Forest Health Protection's technology support and development activities were distributed over five programs in four geographically separate locations, each having administratively unique structures. Through these five programs (Methods Application Group, National Center of Forest Health Management, Pesticide Application Group, Technology Development Program and National Agricultural Pesticide Impact Assessment Program) technologies have been developed, adapted, and transferred to Forest Service field units and their cooperators.

The five technology development program areas were restructured during 1995 into the Forest Health Technology Enterprise Team. The intent of this restructuring was to improve the capability of Forest Health Protection to deliver technology to its stakeholders.

The target organization of FHTET will consolidate functions currently being performed by FHTET-Davis, Davis, California, into FHTET-Fort Collins and FHTET-Morgantown operations.

ORGANIZATION CHART



GENERAL PROGRAM WORK AREAS

The following reflects the Forest Health Technology Enterprise Team's general program work areas:

Information Services	Information retrieval, information letters (e.g., <i>Timely Tips</i> , <i>FSCBG Technology Transfer Letter</i> , <i>Forest Health Technology Enterprise Team Update</i>), and database construction
Technical Support Services	Technical consultations, model runs, airborne video, photo missions, data visualization, photointerpretation
Training and Education	Certification and continuing education programs, FS national training, skill refresher courses, manuals
Technology Development	FHP Technology Development Program, National Agricultural Pesticide Impact Assessment Program, model development, hardware development, software development
Methods Improvements	Biological control, biorationals, nontarget impact studies, environmental fate studies

EXPECTED OUTCOMES OF THE NEW ORGANIZATION

- Coordinated technology development and service activities within Forest Health Protection to foster teamwork and increase productivity, efficiency, and customer satisfaction.
- Technology development and related service, managed under an Enterprise Team concept and accomplished utilizing the self-managed team concept.
- Streamlined operations through elimination of duplicative efforts.
- Enhanced delivery of services to Forest Health Technology stakeholders.
- Improved accountability and responsiveness to customer needs.

FOCUS AREAS

Forest Health Technology Enterprise Team-Fort Collins

USDA Forest Service
3825 E. Mulberry St.
Fort Collins, CO 80524
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FAX: 970-498-1660
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DG Mailbox: FPM:W04A

MISSION: To provide forest health assessment technologies that are integral to forest ecosystem management

Focus Area: Data and Information Needs

Objective: Guide efforts for evaluating, developing, and transferring appropriate technologies for data collection, management, and analysis.

Focus Area: Analysis and Modelling

Objective: Provide managers with analytical models of forest ecosystem processes involving pathogens, fire, and other disturbance factors that can translate the effects of forest management actions into vegetation-based indicators.

Focus Area: Decision Support Systems

Objective: Develop information management capabilities that incorporate information about forest health change agents, and their roles in ecosystems; develop a decision support environment that facilitates communication and learning among stakeholders involved in ecosystem management.

Focus Area: Information Display

Objective: Develop affordable, flexible forest information display tools to address increasing public need for information about forest ecosystem issues.

Focus Area: Value Determination

Objective: Develop methods and technologies to identify, measure, and display forest ecosystem values, and to systematically relate these values to forest ecosystem management actions and outcomes.

Software, services, training, and support include:

- Airborne videography systems and training
- Remote sensing services
- Photointerpretation training
- Image processing and analysis services and training
- Data visualization services
- GPS basestation services
- Biometrics Services
- Biological models and decision-support systems

Forest Health Technology Enterprise Team-Davis

USDA Forest Service
2121C Second Street
Davis, CA 95616
Phone: 916-757-8342
FAX: 916-757-8383
Internet: /s=FPM/ou1=r05h@mhs-fswa.attmail.com
DG Mailbox: FPM:R05H

MISSION: To develop, through partnerships with public and private organizations, methods and technology that supports the safe, effective, economical, and efficacious use of physical, chemical, and biological agents to manage forest and range pests.

Focus Area: Pest Control Application Decision-Support Systems

Objective: Develop an easy-to-use field decision support systems based upon existing models for managing forest pests that recommends safety buffer zones and provides probability and predictable levels of control and impact.

Focus Area: FSCBG Spray and Environmental Fate Model

Objective: Develop a capability to predict and account for the fate of pest control agents spray (active and nonactive components) in the air, canopy, and ground following aerial application.

Specific development projects include:

- Spray drift and fate modeling
- Environmental fate and biological fate modeling
- Decision support systems/biological response
- Canopy penetration and drift of biological spray in orchards and complex terrain
- Single tree spray systems
- Pheromone dispersal equipment
- Non-pesticide pest control methods
- Aircraft navigation-Global Positioning Systems (GPS)
- Application systems for biocontrol of noxious weeds

Forest Health Technology Enterprise Team-Morgantown

USDA Forest Service
180 Canfield Street
Morgantown, WV 26505
Phone: 304-285-1563
FAX: 304-285-1505
Internet: /s=NCFHM/ou1=s24L08a@mhs-fswa.attmail.com
DG Mailbox: NCFHM:S24L08A

MISSION: To accelerate the development and adoption of environmentally sound technologies to maintain or improve the health of America's forests.

Focus Area: Biopesticide and Biological Control

Objective: Develop information and technology for control of forest pests.

Some semiochemical projects:

- Disrupting gypsy moth mating using dispalure (a synthetic gypsy moth pheromone)
- Protecting red-cockaded woodpecker cavity trees from southern pine beetle using 4-allylanisole
- Registering a Douglas-fir tussock moth pheromone
- Inventorying semiochemicals for forest and shade tree pests in North America
- Developing quality assurance/control standards for pheromones

Focus Area: Non-Target Impact Studies

Objective: Develop information on the effect of control agents on nontarget species.

Nontarget projects include:

- Nontarget impacts of aerial application of *Bacillus thuringiensis*
- Nontarget impacts of gypsy moth defoliation
- Developing guidelines to determine nontarget effects of pesticides on Lepidoptera in forested ecosystems
- Developing a database of impacts of pesticides on non-targets in forest ecosystems

ACRONYMS

The following are acronyms and that appear throughout the project summaries and descriptions that follow.

AIPM	Appalachian Integrated Pest Management
APHIS	Animal and Plant Health Inspection Service
ARS	Agricultural Research Service
CDI	Continuum Dynamics, Inc.
CIO	Chief Information Officer
CSU	Colorado State University
DFTM	Douglas-fir tussock moth
DG	Data General
DSS	Decision-Support System
ECM	ectomycorrhizal
EMAC	Ecosystem Management Analysis Center
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESAT	Ecosystem Simulation and Analysis Tools
ESSA	Environmental and Social System Analysts, Ltd.
F&AM	Fire and Aviation Management
FH	Forest Health
FHM	Forest Health Monitoring
FHP	Forest Health Protection
FHTET	Forest Health Technology Enterprise Team
FIDR	Forest Insect and Disease Research
FRI	Forestry Research Institute (New Zealand)
FS	Forest Service
FSCBG	Forest Service-Cramer-Barry-Grim (an aerial application simulation model)
FVS	Forest Vegetation Simulator
FY	fiscal year
GIS	Geographic Information System
GRASS	Geographic Analysis Support System
GSC	Geometronics Service Center
GypsES	Gypsy moth Expert System
HWA	hemlock wooly adelgid
I&D	insect and disease
IIBC	International Institute of Biological Control
IF	International Forestry
INT	Intermountain Forest and Range Experiment Station
IPM	integrated pest management
LAN	local area network
MTDC	Missoula Technological Development Center
NA	Northeast Area
NAPIAP	National Agricultural Pesticide Impact Program
NBS	National Biological Survey
NE	North East (Forest Experiment Station)

NF	National Forest
NFMAS	National Fire Management Analysis System
NFS	National Forest System
NIFC	National Interagency Fire Center
NPS	National Park Service
NPV	nucleopolyhedrosis virus(es)
NWS	National Weather Service
NZ	New Zealand
OSU	Oregon State University
PAO	Public Affairs Office
PC	personal computer
PPQ	Plant Protection and Quarantine (USDA APHIS)
PRC	Peoples Republic of China
Project 615	The new Forest Service-wide computer system and/or its components
PSW	Pacific Southwest Forest and Range Experiment Station
PTIPS	Pest Trend-Impact Plot System
PURS	Pesticide Use Reporting System
QA/QC	quality assurance/quality control
R	Region
RCW	red-cockaded woodpecker
RD	Ranger District, root disease
RFI	request for information
RMS	Rocky Mountain Forest and Range Experiment Station
RRSU	Renewable Resources Staff Unit
RSAC	Remote Sensing Applications Center
RSST	Remote Sensing Service Center
SETAC	Society of Environmental Toxicology and Chemistry
SO	(National Forest) Supervisor's Office
SPB	southern pine beetle
TDP	Technology Development Project
TM	Timber Management
TMSC	Timber Management Service Center
UCB	University of California-Berkeley Campus
UCD	University of California-Davis Campus
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VPI&SU	Virginia Polytechnic Institute and State University
WFHI	Western Forest Health Initiative
WO	Washington Office
WOD	Washington Office Detached unit
WPBR	white pine blister rust
WWW	World-Wide Web (an Internet function)

WORK PLAN TASKS

- PROJECT SUMMARIES
- TASK LEADERS
- PLANNED COMPLETION DATES

AREA A: Management and Operations**OBJECTIVE:** Provide FHTET operations at all sites.

TASK	TASK LEADER	COMPLETION DATE
1. Implement the concept and principles of the Forest Health Technology Enterprise Team (FHTET).	Eav	9/96
2. Ensure the effective and efficient operation of FHTET-Fort Collins (-FC).	Eav	9/96
3. Define and maintain scope and operations at FHTET-Morgantown.	Bullard	9/96
4. Define and maintain scope and operations at FHTET-Davis.	Barry	9/96
5. Coordinate Project 615 implementation during the pilot year in cooperation with Washington Office Detached (WOD) units and Rocky Mountain Forest and Range Experiment Station.	Roschke	9/96
6. Provide systems support for FHTET-FC computer equipment and local area network.	Roschke	9/96

AREA B: Support Services for FHP-WO

OBJECTIVE: To provide information services to the FHP Washington Office for both annual and as-needed tasks.

TASK	TASK LEADER	COMPLETION DATE
1. Administer the Technology Development Program by facilitating identification of needs, monitoring progress, and distributing funds from the FHP Directorate.	Janiga	4/96
2. Support WO production of the Insect and Disease Conditions Report by supporting data entry and tables summarization.	Janiga	7/96
3. Support production of a conference exhibit on forest health and participate in the production of a Forest Health Highlights brochure.	Janiga	5/96
4. Collect and summarize the current status of projects pertaining to the Western Forest Health Initiative for general and legislative audiences.	Janiga	3/96
5. Input data into, and support and maintain, the NAPIAP database; collect requirements for a TDP database; develop a user interface for both databases.	Adams	9/96
6. Collect and manage pesticide use information from Regions, Stations, and NA; prepare Pesticide Use Report for inclusion in the Annual Report of the Forest Service.	Roschke	1/96
7. Provide database development and data management support to FHP-WO to meet national reporting requirements on forest health conditions and trends.	Pywell	9/95
8. Manufacture and distribute pheromone traps to western Regions and State cooperators as part of the Douglas-fir tussock moth early warning system.	Scrivner	6/96

AREA C: Data and Information Needs

OBJECTIVE: Guide efforts for evaluating, developing, and transferring appropriate technologies for data collection, management, and analysis.

TASK	TASK LEADER	COMPLETION DATE
1. Provide services and support to the field for acquisition of remotely sensed data in support of forest health monitoring programs and other resource activities.	Myhre	9/96
2. Provide training to FHP personnel on remote sensing technologies.	Myhre	4/96
3. Amend and update the Airborne Video System Users Guide to include developments for automated digital mosaicking of video imagery.	Myhre	9/96
4. Develop a vegetative cover and fire fuels database for the State of Colorado suitable for broad-scale ecosystem management analysis and insect and disease host maintenance.	Pywell	9/97
5. Evaluate new sensor technologies for remote sensing,, including multi-spectral video and digital photographic systems.	Pywell	12/96
6. Complete development of automated mosaicking capability for existing field-deployed airborne video systems, including integration of the Kodak digital attitude sensor, and encrypted GPS receivers.	Pywell	9/96
7. Evaluate the utility of various classified sensors for potential declassification and application to forest health monitoring.	Pywell	9/96
8. Develop and implement a strategy for integrating existing remote sensing technologies into FHP's operational aerial survey program.	Pywell	9/96

AREA D: Analysis and Modeling

OBJECTIVE: Provide managers with analytical models of forest ecosystem processes involving pathogens, fire, and other disturbance factors that can translate the effects of forest management actions into vegetation-based indicators.

TASK	TASK LEADER	COMPLETION DATE
1. Provide maintenance and user support for the western insect and pathogen simulation models and their links to the Forest Vegetation Simulator model variants.	Adams	9/96
2. Extend and support availability of FVS and its insect and disease extensions to personal computers; enable retrieval of models from a bulletin board.	Adams	9/96
3. Complete the Users Guide for the Western Root Disease Model; begin work on the White Pine Blister Rust Model Users Guide and the Initialization Data for Models Report.	Adams	9/96
4. Produce a training package for the Dwarf Mistletoe Model, including slides, transparencies, and presenter's notes.	Adams	9/96
5. Provide training and support to field personnel in the use of growth-and-yield/ insect and pathogen simulation models for forest resource planning.	Adams	9/96
6. Integrate existing and permanent plot data to improve validation, calibration, and development of pest models and pest damage estimates for dwarf mistletoe, root disease, western spruce budworm, white pine blister rust, and comandra rust.	Adams	9/96
7. Develop Project 615 and MS-Windows interfaces for FVS and insect and pathogen models.	Janiga	9/96
8. Implement the West-Wide Pine Beetle Model on landscape-level ecosystem management and forest health protection projects.	Smith	9/96
9. Review approaches for modeling total pest impacts over time and begin building a prototype model of one or more approaches.	Smith	8/96
10. Provide support and coordination to multi-stand and multi-resource model efforts by FHTET cooperators.	Smith	9/96

AREA D: Analysis and Modeling (cont.)

OBJECTIVE: Provide managers with analytical models of forest ecosystem processes involving pathogens, fire, and other disturbance factors that can translate the effects of forest management actions into vegetation-based indicators.

TASK	TASK LEADER	COMPLETION DATE
11. Test pest model behavior and results in order to operate the models over a wide range of conditions.	Smith	12/96
12. Continue development of a visual output component for forest insect and disease models that will allow the display of pest impacts, forest fuels, and forest management alternatives; develop an interface to access these capabilities through INFORMS and FVS.	Pywell	9/96
13. Provide statistical support and consulting to field units, including project reviews and statistical training.	Smith	9/96
14. Complete development of a landscape assessment methodology; begin testing and refining this methodology.	Williams	9/96
15. Change the PTIPS data structure to the AllVeg/PTIPS database structure.	Adams	9/96

AREA E: Decision Support Systems

OBJECTIVE: Develop information management capabilities that incorporate information of forest health, change agents, and their roles in ecosystems; develop a decision-support environment that facilitates communication and learning among stakeholders involved in ecosystem management.

TASK	TASK LEADER	COMPLETION DATES
1. Provide oversight and consultation services for the development and distribution of a rulebase toolkit.	Williams	9/96
2. Re-engineer INFORMS-R8 to run on an IBM workstation.	Williams	9/96
3. Incorporate landscape assessment query and spatial analysis and reporting routines into INFORMS.	Williams	9/96
4. Investigate the integration of Suppose... and INFORMS.	Williams	6/96
5. Evaluate the GypsES decision-support system for future engineering, distribution, and maintenance.	Williams	7/96
6. Exchange information with FS staffs on decision analyses for ecosystem management with special emphasis on insect and disease management for forest health protection.	Janiga	9/96

AREA F: Information Display

OBJECTIVE: Develop affordable, flexible forest information display tools to address increasing public need for information of forest ecosystem issues.

TASK	TASK LEADER	COMPLETION DATES
1. Provide training in evaluation, use, and application of remote sensing image processing, data visualization, and GIS technologies to FHP field units and other cooperators.	Pywell	9/96
2. Provide support for the TDP implementation of SmartForest visualization software on the Dixie National Forest.	Pywell	12/96

AREA G: Value Determination

OBJECTIVE: Develop methods and technologies to identify, measure, and display forest ecosystem values, and to systematically relate these values to forest ecosystem management actions and outcomes.

TASK	TASK LEADER	COMPLETION DATE
1. Identify, gather, review, and build a database of pest-related value research; determine the needs of FHP managers for value-related information.	Smith	9/96
2. Complete ongoing review of Forest Service valuation and risk approaches to program and project analyses.	Smith	12/96

AREA H: Communications**OBJECTIVE:** Complete management and administrative organizational tasks.

TASK	TASK LEADER	COMPLETION DATES
1. Provide support to external communications for FHTET.	Janiga	9/96
2. Evaluate options and development procedures for establishing an education certification program for in-house training activities.	Myhre	9/96
3. Provide support and infrastructure for preparing and converting FHTET products, services, and information for distribution through Internet.	Roschke	9/96
4. Conduct a workshop to introduce Internet and World-Wide Web services to FHP personnel from Regions, Stations, Northeast Area, and Washington Office.	Roschke	3/96
5. Maintain and update FHTET presentation graphics packages and communication materials.	Scrivner	9/96
6. Prepare a plan to close the FHTET-Davis office.	Barry	9/96
7. Prepare a plan to transfer management of FSCBG model in FY97 and beyond.	Barry	6/96

AREA I: Decision-Support Systems for Pest Control**OBJECTIVE:** To develop decision-support systems for pesticide application.

TASK	TASK LEADER	COMPLETION DATE
1. Demonstrate and evaluate herbicide ground treatment methods for supporting species diversity, ecosystem management, and forest health in a middle-aged Douglas-fir forest.	Barry	12/96
2. Investigate the influence of vertical temperature difference (stability) on the canopy penetration, drift, and fate of aerial sprays applied over orchards and forests.	Barry	8/97
3. Contract with a cooperator for a book on forest meteorology for use in planning and conducting meteorologically sensitive operations.	Barry	1/97
4. Enhance the FSCBG Model with the capability to predict insecticide spray coverage in various types of eastern hardwood canopies subject to gypsy moth attack.	Barry	12/95
5. Develop decision-support system for the FSCBG aerial spray model on biological dose response.	Barry	9/97
6. Update plan for a national database that will catalogue, enter, and retrieve publications & reports related to pesticide application and environmental fate.	Skyler	8/96
7. Coordinate and provide program direction for the FHP technology program at MTDC.	Barry	9/96
8. Coordinate FSCBG/AGDISP user training needs and information and conduct model runs for FS and cooperators.	Skyler	9/96
9. Organize and chair symposium on decision-support systems at the international meeting, American Society of Agricultural Engineers.	Barry	7/96
10. Chair National Spray Model and Application Technology Steering Committee and organize a meeting in 1996.	Barry	7/96
11. Coordinate, gather, and update database of annotated bibliography of western defoliator field experiments, pilot, demonstration, and other projects and distribute to regions.	Skyler	8/96

AREA I: Decision-Support Systems for Pest Control (cont.)**OBJECTIVE:** To develop decision-support systems for pesticide application.

TASK	TASK LEADER	COMPLETION DATE
12. Assist WO/FHP in preparing graphics for a regional summary of pesticide use for distribution to the regions.	Skyler	9/96
13. Serve as COR for FSCBG model enhancements evaluation and technology transfer contract.	Barry	12/96
14. Coordinate FHP/MTDC technology development and cooperative projects with Forest Research Institute, New Zealand	Barry	12/95

AREA J: Environmental Fate Studies**OBJECTIVE:** To develop information on the environmental fate of pesticides.

TASK	TASK LEADER	COMPLETION DATE
1. Summarize and report information on information on dispersion and fate of <i>Bt</i> in forested mountain terrain; evaluate the FSCBG model in predicting and measuring <i>Bt</i> drift, measuring <i>Bt</i> canopy deposition, and monitoring fate of <i>Bt</i> in forest soil.	Barry	10/95
2. Present results of <i>Bt</i> environmental fate studies conducted on gypsy moth in Utah at the International Congress of Society of Environmental Toxicology and Chemistry.	Barry	11/95
3. Present joint paper with New Zealand on biological dose response model at the International Congress of Society of Environmental Toxicology and Chemistry.	Barry	11/95

AREA K: Biological Controls

OBJECTIVE: To develop biological information and technology for control of forest pests.

TASK	TASK LEADER	COMPLETION DATE
1. Initiate population dynamics and life history analyses of hemlock woolly adelgid populations on eastern hemlock.	Reardon	12/96
2. Develop an inventory of semiochemicals of North American forest and shade tree insects; assess the status of each semiochemicals for forest pest management; produce a publication listing and describing these semiochemicals and suggesting development priorities.	Reardon	12/96
3. Develop an inventory of microbials and nematodes for potential use in managing major North American forest and shade tree insects.	Reardon	12/96
4. Develop and implement QA/QC standards for manufacturing semiochemicals used in monitoring forest and shade tree insects.	Reardon	12/96
5. Study the current status and use of biological controls to manage noxious weeds in forest ecosystems.	Reardon	12/96
6. Coordinate the development of an operational integrated pest management program for the common pine shoot beetle.	Reardon	12/97
7. Determine the species (strain) of ECM fungus for use, in combination with other treatments, in suppression of <i>Cylindrocladium</i> root disease.	Reardon	3/98
8. Coordinate the development of an operational biological control program for Mile-a-Minute Weed.	Reardon	9/98
9. Develop an operational technique to protect red-cockaded woodpecker nesting sites from southern pine beetle attack.	Reardon	4/97
10. Obtain registration of the Douglas-fir tussock moth pheromone for use in managing low-density populations.	Reardon	12/97
11. Improve application technology for biopesticides in forests to replace technology for application of insecticides	Reardon	12/98

AREA K: Biological Controls (cont.)**OBJECTIVE:** To develop information and technology for control of forest pests.

TASK	TASK LEADER	COMPLETION DATE
12. Develop biological control agents for use against the cypress aphid in Kenya.	Reardon	12/96
13. Cooperate with ARS, APHIS, and IIBC in developing biological control agents to manage forest and urban pests.	Reardon	Ongoing
14. Develop biological control agents for use against mealybugs in the Peoples Republic of China.	Reardon	12/96
15. Develop biological control agents for use against the woodwasp in Brazil.	Reardon	12/97
16. Develop biological control agents for use against the hemlock woolly adelgid.	Reardon	12/96
17. Administer the Forest Service segment of the National Agricultural Pesticide Impact Assessment Program.	new PM	Ongoing
18. Determine relative efficacy of silvicultural and insecticide options for managing gypsy moth impacts.	Reardon	9/97
19. Develop semiochemicals for control and monitoring of pest/indicator species.	Reardon	12/97
20. Support Swath Kit for cooperative suppression/eradication programs.	Reardon	12/96
21. Develop biological controls for suppression of root diseases in nurseries.	Reardon	3/98
22. Develop analysis and environmental fate of biological insecticides used to control forest defoliators.	Reardon	12/96

AREA L: Non-Target Studies

OBJECTIVE: To develop information on the effect of control agents on non-target species.

TASK	TASK LEADER	COMPLETION DATE
1. Determine the potential long-term impacts of selected insecticides and defoliation on specific non-target terrestrial arthropods, salamanders, and birds associated with broad-leaved forests.	Reardon	12/99
2. Quantify non-target <i>Bt</i> and Gypchek impacts on Lepidoptera in southeastern North Carolina; develop a checklist of Lepidoptera found in unique habitats and habitats of special concern in southeastern North Carolina.	Reardon	12/96
3. Establish minimum guidelines for non-target species impact evaluations for Lepidoptera in forest ecosystems.	Reardon	12/96
4. Determine effects of previously released natural enemies of selected pests on non-target species in North America.	Reardon	9/98

PROJECT DESCRIPTION PAGES

DEFINITION OF "LEADER ROLE"

In the following project descriptions, the Leader Role information refers to the role that FHTET plays in the project. The technical projects of the FHTET can be carried out with various types of involvement by FHTET staff:

Conduct	The project is conducted by FHTET personnel.
Cooperate	The project is conducted jointly by FHTET personnel and cooperators, but FHTET personnel have a direct, doing role.
Coordinate	The actual work is conducted by several cooperators, while the FHTET's role is to ensure that the appropriate groups are involved.
Facilitate	FHTET personnel have no major involvement in the project other than ensuring that appropriate groups are aware of each other.
Provide oversight	FHTET personnel ensure that the project is underway and on target.

PROJECT NO.: A1

PROJECT NAME: FHTET Leadership

LEADER: Eav

LEADER ROLE: Conduct and coordinate.

PROJECT OBJECTIVE: To fully implement the concept and principles of the Forest Health Enterprise Team.

BACKGROUND/RATIONALE: On February 10, 1995, the Deputy Chief for State and Private Forestry, in the spirit of Forest Service Reinvention, chartered a Forest Health Technology Enterprise Team (FHTET) to deliver forest health technology services to Forest Service field units, State, and private partners in support of our land ethic, "promote the sustainability of ecosystems by ensuring their health, diversity, and productivity."

FHTET is envisioned to have a dichotomy of functions. A central component (core) will consist of activities that support the Forest Service in meeting its legal mandate in the protection of forest health. An entrepreneurial component will develop, over time, in a manner to ensure that the team becomes a forest health technology service provider on a competitive and cost-reimbursable basis.

METHODS: The FHTET implementation plan details the process of fully implementing the Enterprise Team and its operating principles. Activities to be undertaken under direct leadership of FHTET Team Leader in fiscal year 1996 are listed below.

Develop FHTET's FY96 Program of Work
Develop FHTET strategic plan
Expand entrepreneurial aspects of the Team
Develop entrepreneurial related marketing materials
Expand and strengthen existing partnerships and establish new ones
Refine Team's role and negotiate agreements for administrative support in light of the Forest Service evolving administrative structure
Initiate staff retraining program where required and appropriate

PRODUCTS AND DELIVERY DATES:

FHTET FY96 Program of Work	April 1996
FHTET Strategic Plan	September 1996
FHTET Capability Document	September 1996
Board of Directors Meeting	April 1996
FHTET Administrative Review Plan	July 1996

START/END DATES: FY96

COOPERATORS: WO FHP Staff; FHP Regional Directors.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Eav	8 weeks
Barry	4 weeks
Bullard	4 weeks

PROJECT NO.: A2

PROJECT NAME: FHTET-FC Operations

LEADER: Eav

LEADER ROLE: Conduct and provide oversight.

PROJECT OBJECTIVE: To ensure the effective and efficient operation of FHTET-FC.

BACKGROUND/RATIONALE: The role of the Director is to provide leadership, overall direction and planning, and oversight in accomplishing the mission and goals of the unit.

METHODS: Work with the Washington Office (WO), Regional/Area Forest Health Protection (FHP), other FHTET directors and staffs, and the FHTET Steering Committee to establish the general direction for the unit. Long-term and annual programs of work will be developed in coordination with these, along with other Forest Service units and appropriate outside groups, such as APHIS, ARS, USFWS, EPA, state agencies, industry, university scientists, public interest groups, and governmental agencies of foreign countries. The technical projects in the Program of Work will be carried out by the FHTET-FC staff and cooperators with the assistance, coordination, and oversight of the FHTET-FC Director and staff.

PRODUCTS AND DELIVERY DATES:

1995 Accomplishment Report	April 1996
FHTET-FC's input to the 1996 POW	March 1996
FHTET 1997 POW	
draft	June 1996
final	September 1996

START/END DATES: October 1995-September 1996

COOPERATORS: WO FHP Staff; FHP Regional Directors.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Eav	24 weeks
Adams	2 weeks
Haynes	30 weeks
Janiga	4 weeks
Means	46 weeks
Myhre	2 weeks
Pywell	6 weeks
Roschke	4 weeks
Scrivner	6 weeks
Smith	2 weeks
Williams	4 weeks

PROJECT NO.: A3

PROJECT NAME: FHTET-Morgantown Operations

LEADER: Bullard

LEADER ROLE: Conduct, facilitate, and provide oversight.

PROJECT OBJECTIVES: To define and maintain FHTET-Morgantown scope and operations.

BACKGROUND/RATIONALE: The role of the Director is to provide leadership, overall direction and planning, and oversight in accomplishing the mission and goals of the unit.

METHODS: Work with the WO, Regional/Area FHP, other FHTET directors and staffs, and the FHTET Steering Committee to establish the general direction for the unit. Long-term and annual programs of work will be developed in coordination with these along with other Forest Service units and appropriate outside groups, such as APHIS, ARS, USFWS, EPA, state agencies, industry, university scientists, public interest groups, and governmental agencies of foreign countries. The technical projects in the Program of Work will be carried out by the cooperators with the assistance, coordination, and oversight of the FHTET-M Director and staff.

PRODUCTS AND DELIVERY DATES:

1995 Accomplishment Report	January 1996
FHTET 1996 POW	March 1996
Hire Impacts and Pesticides Program Manager	April 1996
FHTET Strategic Plan	
draft	March 1996
final	September 1996
FHTET 1997 POW	
draft	June 1996
final	September 1996
1996 Accomplishment Report	October 1996
Incorporate appropriate FHTET-Davis functions into FHTET-M, revise FHTET-M Strategic Plan, revise FHTET staffing plan if/as appropriate	June 1996

START/END DATES: October 1995-September 1996

COOPERATORS: FHP-WO Staff; FHP Regional Directors.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Bullard	46 weeks
Cress	46 weeks
Reardon	6 weeks
Impacts and Pesticides PM	4 weeks
Ecosystem Health PM (planned)	6 weeks

PROJECT NO.: A4

PROJECT NAME: FHTET-Davis Operations

LEADER: Barry

LEADER ROLE: Conduct, facilitate, and provide oversight.

PROJECT OBJECTIVES: To define and maintain FHTET-Davis operations and productivity.

BACKGROUND/RATIONALE: The role of the Director is to provide leadership, overall direction and planning, and oversight in accomplishing the mission and goals of the unit.

METHODS: Work with the WO, Regional/Area FHP, other FHTET directors and staffs, FHTET Steering Committee, and other stakeholders to establish the general direction for the unit. Programs of work are developed in coordination with these along with other Forest Service units and other stakeholders. The technical projects in the Program of Work will be carried out by Director, FHTET-Davis, his staff, and cooperators.

PRODUCTS AND DELIVERY DATES:

1995 Accomplishment Report	September 1995
FHTET 1996 POW	March 1996
FHTET Strategic Plan	
draft	March 1996
final	September 1996
FHTET 1997 POW	
draft	June 1996
final	September 1996
1996 Accomplishment Report	October 1996
Plan to close FHTET-Davis Office	September 1996
Plan to transfer management of FSCBG MODEL	June 1996

START/END DATES: October 1995 - September 1996

COOPERATORS: FHP-WO Staff; FHP Regional Directors; New Zealand Forest Research Institute.

RESOURCE REQUIREMENTS (FHTET-Davis):

Barry
Skyler

PROJECT NO.: A5

PROJECT NAME: Project 615 Implementation

LEADER: Roschke

LEADER ROLE: Cooperate, facilitate, and provide oversight.

PROJECT OBJECTIVE: To coordinate, in cooperation with Washington Office Detached (WOD) units and Rocky Mountain Forest and Range Experiment Station (RMS), Project 615 implementation during the Project 615 Pilot Year. Assess existing capabilities to access IBM equipment (e.g., existing non-contract x-terminals, PCs and Macs with x-terminal emulation software) and the need for purchasing additional Project 615 contract capabilities to support the Forest Health Technology Enterprise Team-Fort Collins (FHTET-FC, formerly FHTET-FC) personnel and projects. Provide support for workstation connectivity.

BACKGROUND/RATIONALE: The Washington Office Detached units in Fort Collins are participating in the Project 615 Pilot Year evaluation. Rocky Mountain Station personnel will provide system support similar to support provided for the Data General system. FHTET-FC staff members have been working with IBM systems similar to Project 615 equipment, and have acquired a variety of equipment for accessing those systems and a degree of experience and expertise in using the systems and some of its software. During FY96, we will evaluate the Project 615-pilot equipment to assess additional capabilities needed to support WOD, assess our current capabilities to access the new systems, and assess training needs.

METHODS: Represent FHTET in Project 615 planning sessions; provide liaison with WOD and RMS. Work with Station personnel in installation and implementation of new equipment, and in incorporating existing equipment into the corporate computing environment; ensure that FHTET-FC's needs in the Project 615 environment are met.

PRODUCTS AND DELIVERY DATES:

IBM Project 615 Implementation Plan for FHTET-FC	March 1996
Support for FHTET-FC	September 1996

START/END DATES: Ongoing

COOPERATORS: Washington Office Detached units; Rocky Mountain Station.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Roschke	8 weeks
Pywell	1 week
Funding	\$37,500

PROJECT NO.: A6

PROJECT NAME: Computer System Support

LEADER: Roschke

LEADER ROLE: Cooperate, coordinate, and provide oversight.

PROJECT OBJECTIVE: To provide systems support for FHTET-FC computer equipment and local area network (LAN), including maintaining PCs, Macs, workstations, IBM/Project 615 equipment, printers, backups, and hardware and software tracking, purchasing, and updating.

BACKGROUND/RATIONALE: FHTET-FC uses a variety of networked computer systems, equipment, and software in an increasingly complex computing environment. Maintaining, enhancing, and tracking these systems has become increasingly time-consuming. Some of these tasks can be more efficiently handled through centralized support.

METHODS: Provide a focal point for computer systems and network support.

PRODUCTS AND DELIVERY DATES:

Inventory of new equipment and software

September 1996

START/END DATES: Ongoing

COOPERATORS: None.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Roschke	4 weeks
Scrivner	8 weeks
Funding	\$117,500

PROJECT NO.: B1**PROJECT NAME:** Technology Development Program Management**LEADER:** Janiga**LEADER ROLE:** Conduct, cooperate, facilitate, and provide oversight.**PROJECT OBJECTIVE:** To administer the Technology Development Program by facilitating the identification of needs, monitoring of progress, and distributing funds by the FHP Directorate.**BACKGROUND/RATIONALE:** The Forest Health Technology Enterprise Team has been given responsibility for communicating priorities for projects, reviewing proposals, disbursement and accountability to Regions/Area, and reporting project progress and accomplishments in accordance with direction set by the WO Director of Forest Health Protection.**METHODS:** FHTET will develop actions and milestones for the program in fiscal year 1996 with cooperators: the process followed in the previous six years will remain largely unchanged. Two value-added activities will be introduced: the development of a database of proposals and results suitable for query through microcomputers used by the WO staff, and assembly of a compendium of completed project reports.

FHTET will distribute the TDP request letter and all relevant informational documents; proposals from Region and Area offices will be gathered, organized, and distributed to a review team. FHTET will convene a review team meeting and provide resulting recommendations to the FHP Director for final analysis and approval. Disposition of proposed projects and funding allocations will be sent to Region and Area FHP directors via their respective leadership teams (Regional Foresters). FHTET will coordinate the construction of a database with the NAPIAP program in order to devise a single database for tracking projects and proposals under both programs. Accessibility of the database by personnel outside the agency will be evaluated; findings of the evaluation will be provided to the FHP Director. FHTET-FC will provide long-term support of the database.

PRODUCTS AND DELIVERY DATES:

Detailed set of activities and milestones documented	August 1995
Proposal request letter	September 1995
Proposal compilation and dissemination to reviewers	November 1995
Convene review team	January 1996
Announcement of disposition of proposals and funding	February 1996
Compendium of completed project reports and tracking database	April 1996

START/END DATES: Ongoing**COOPERATORS:** Mel Weiss, FHP-WO; Nancy Lorimer, FHP-WO; Dick Reardon, FHTET-Morgantown; TDP review team consisting of FHP Region and Area delegates.**RESOURCE REQUIREMENTS (FHTET-Fort Collins):**

Janiga	8 weeks
Funding	\$19,500

PROJECT NO.: B2

PROJECT NAME: Support for WO Production of Insect and Disease Conditions Report

LEADER: Janiga

LEADER ROLE: Cooperate.

PROJECT OBJECTIVE: To provide support for WO production of Insect and Disease Conditions Report.

BACKGROUND/RATIONALE: Forest Health Protection Washington Office (FHP-WO) annually produces a status report of insect and disease conditions in the United States. This report includes summary data of land area where specific insects and diseases of forest vegetation occur. The data is collected in tabular and graphic form (maps) from Regions and the Northeast Area (NA). FHTET-FC will support the data entry and summarization of tables and maps submitted by the Region and Area offices in cooperation with the Asheville office of Forest Health in Region 8.

FHTET-FC has provided support for data entry and reporting of insect and disease tables submitted by regions and area via the Forest Pest Information System database. This support will continue.

METHODS: The WO will request data, graphics, and narratives from the Regions/Area. Data and graphics will be forwarded to FHTET-FC for processing. Summary portions of the report will be returned to the WO for incorporation with narratives. WO will arrange for editorial support and publication with NA and the Public Affairs Office (PAO), respectively. WO will produce 20,000 copies of the report.

PRODUCTS AND DELIVERY DATES:

Detailed task list and milestones	August 1995
Request for information released by WO	January 1996
Regional/Area information accumulated	February-March 1996
Summary tables and maps sent to WO	April 1996

START/END DATES: Ongoing

COOPERATORS: Dick Fowler, FHP-WO.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Janiga	2 weeks
Scrivner	5 weeks
Williams	2 weeks
Funding	\$31,500

PROJECT NO.: B3

PROJECT NAME: Forest Health Display and Highlights

LEADER: Janiga

LEADER ROLE: Cooperate.

PROJECT OBJECTIVE: To provide support for the production of a professional conference exhibit on Forest Health ("the exhibit") and participate in the production of a Forest Health Highlights brochure in preparation for taking full responsibility for the brochure in fiscal year 1997.

BACKGROUND/RATIONALE: The Forest Health Protection Director has asked that the FHTET-FC use its talents and project management skills to provide an exhibitor's booth for Forest Health at the October 1995 Society of American Foresters annual conference. The Director has also requested that FHTET anticipate taking responsibility for producing Forest Health status report/document(s) in fiscal year 1997.

METHODS: The project leader will develop a detailed set of actions and resource commitments necessary to undertake these activities via a meeting with cooperators in the WO. The exhibit will either be produced by PAO staff Marion Logstrom or graphics designers in the Denver/Ft. Collins area. FHP-WO already has a suitable flexi-frame for mounting the display materials. All logistics and expenses of hosting the exhibit will be borne by FHTET-FC.

Joe Lewis of the FHP-WO is designing a forest health brochure in cooperation with Linda Feldman of PAO. In fiscal year 1996 the full process of design to production will be done by FHP-WO, with minor participation by FHTET-FC. During this time, FHTET-FC will gather knowledge of the process, alternative ways to portray forest health information, and resources necessary to take over update and production of the same or similar report/brochure annually, starting in fiscal year 1997. A project plan for fiscal year 1997 will be developed in 1996.

PRODUCTS AND DELIVERY DATES:

Detailed action list supporting project	August 1995
Forest Health Exhibit Completion	October 1995
Forest Health Brochure Project plan for fiscal year 1997	May 1996

START/END DATES: FY96 - FY97

COOPERATORS: Joe Lewis, FHP-WO; Marion Logstrom and Linda Feldman, PAO-WO.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Janiga	3 weeks
Smith	2 weeks
Funding	\$5,000

PROJECT NO.: B4

PROJECT NAME: Western Forest Health Initiative Database

LEADER: Janiga

LEADER ROLE: Conduct and cooperate.

PROJECT OBJECTIVE: To collect, document, and communicate information as part of the Western Forest Health Initiative Database (WFHI) for project maintoring and accountability.

BACKGROUND/RATIONALE: Forest Health Protection has been directed to track the status of over 300 projects undertaken by field offices under the auspices of the Western Forest Health Initiative. The current status of projects must be collected annually and summarized in a brief report suitable for an audience of the general population and Congressional representatives and staffers.

The Western Forest Health Initiative describes over 300 field projects that have been undertaken to restore or protect forest health in the western U.S. FHP-WO periodically is requested to provide status information regarding the level of funds expended, the status of operations, and the benefits being accrued by the projects. FHP-WO requests that FHTET-FC lead the process for collecting, documenting, and communicating this information as a means of monitoring the progress of the WFHI and promoting accountability for the management of WFHI projects.

METHODS: The project leader and cooperators will develop a detailed list of milestones and products. The collection of status information from field offices will be initiated as soon as possible, and a summary report generated in draft form. The existing database will be maintained and improved to serve as repository for the collected information as needed.

PRODUCTS AND DELIVERY DATES:

Detailed milestone and product list	August 1995
Draft request for data from FHP coordinators	October 1995
Request for information from FHP coordinators	October 1995
Database development and population with data	November 1995
Draft report to FHP-WO Director for review	January 1996
Completed annual WHFI project report	March 1996

START/END DATES: FY96 - FY97

COOPERATORS: Mel Weiss and Joe Lewis, FHP-WO; Forest Health Coordinators, all regions; Linda Feldman, PAO-WO.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Janiga	4 weeks
Funding	\$13,500

PROJECT NO.: B5

PROJECT NAME: NAPIAP Database Support and TDP Database Evaluation

LEADER: Adams

LEADER ROLE: Conduct.

PROJECT OBJECTIVE: To receive and input data that have been collected by Morgantown into the database; to support and maintain the database, and improve the ease-of-use and functionality of the database, interface, and database query capabilities.

BACKGROUND/RATIONALE: The NAPIAP database was developed approximately 5 years ago to meet the needs of the users at that time. Since then, many of the individuals using and relying on the database, expectations and requirements of the database, and reports desired from the database have changed. Changes to the database application will be required.

At the same time, the recently defined TDP process requires a database application to be built to hold TDP information. The NAPIAP and the TDP processes share a number of similarities, with the result that one database design could be used to serve both database requirements. An evaluation of the two processes, and their respective database requirements and reporting needs will be done to minimize future development time. A common interface will be developed to assist the users of both systems, reducing the learning curve for users of both systems.

METHODS: Requirements for both systems will be identified and compared. If possible, one database will serve both systems.

PRODUCTS AND DELIVERY DATES:

Requirements for NAPIAP	May 1996
Interface for NAPIAP & TDP	September 1996

START/END DATES: Ongoing

COOPERATORS: Dick Reardon, FHTET-Morgantown; Gary Smith, FHP-WO.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Adams	2 weeks
Janiga	1 week
Funding	\$7,500

PROJECT NO.: B6

PROJECT NAME: PURS Database Support and Report

LEADER: Roschke

LEADER ROLE: Coordinate.

PROJECT OBJECTIVE: To collect and manage pesticide use information from Regions, Stations, and the Northeast Area; to prepare the Pesticide Use Report for inclusion in Annual Report of the Forest Service.

BACKGROUND/RATIONALE: One of the tables included in the annual "Report of the Forest Service" is a summary report of pesticide use on National Forest lands, listing the active ingredients, the target pest or purpose, the quantities used, and the units treated for each pesticide. An Oracle database application has been developed at FHTET-FC and used for the last few years to manage the data and produce the report.

METHODS: Send a call letter requesting data from Regions, Stations, and the Area. Work with Dave Thomas to secure the help of a pesticide specialist for data checking and verification. Enter the data into the database with the cooperation of the pesticide specialist. Once the data is verified, produce the annual pesticide use report and submit it for inclusion in the Annual Report of the Forest Service.

PRODUCTS AND DELIVERY DATES:

Call letter	September 1995
Data entered and verified	December 1995
Annual pesticide use report submitted	January 1996

START/END DATES: FY96

COOPERATORS: Dave Thomas, FHP-WO; pesticide coordinators in Regions, Station, and Area; pesticide specialist for data verification (e.g., Paul Mistretta, R8 FHP).

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Roschke:	2 weeks
Funding	\$10,500

PROJECT NO.: B7

PROJECT NAME: FHP-WO Support for National Reporting Requirements

LEADER: Pywell

LEADER ROLE: Conduct.

PROJECT OBJECTIVE: To provide database development and data management support to the FHP-WO, including requesting data from field units, data entry, data verification, data summary, map preparation, analysis, and interpretation to meet national reporting requirements on forest health conditions and trends.

BACKGROUND/RATIONALE: FHP-WO has a number of data reporting requirements that require the collection, analysis, and synthesis of insect and disease occurrence across the U.S., both for an individual year and for the monitoring of trends over time. Many of these requirements rely on data from aerial pest detection surveys conducted by FHP field units. This task will result in a process for pulling together in one place a single database of aerial survey data in digital form, which will improve our ability to provide reports, maps, and responses to ad-hoc queries about insect and disease occurrence and trends in the U.S. The process should also contribute to standardization of data collection and coding procedures between Regions.

METHODS: The Regions' routine aerial survey activities will provide the data used for this task. As most Regions currently digitize this data, FHTET-FC will request the data in this form. In cases where data have not been digitized, the data conversion will be performed at FHTET-FC. FHTET-FC will then construct a national GIS database and incorporate historic data into the database so that trends can be analyzed. FHTET-FC will evaluate the feasibility of incorporating other "off frame" Forest Health Monitoring (FHM) data. FHTET will develop a map and digital database showing insect and disease risk for the WO-Forest Health Assessment Team in cooperation with the Regions/Area, and coordinate the map compilation by the Regions and for producing the digital database. FHTET-FC will produce digital and hardcopy maps showing FHP activities on other federal lands, and solicit the necessary data from the Regions/Area, build the database, and produce the final map.

PRODUCTS AND DELIVERY DATES:

Map of FHP activities on other federal lands	December 1995
I&D national risk map	April 1996
Data base for all Regions of 1995 survey data	June 1996
Report on inter-Regional differences and recommended standards for 1997	September 1996
Procedures for producing data for WO reporting requirements	December 1996

START/END DATES: Ongoing

COOPERATORS: Lewis, FHP-WO; F&AM; Regions/Area; Loomis, FHM-RTP; Lachowski, RSAC.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Pywell	8 weeks
Funding	\$39,400

PROJECT NO.: B8

PROJECT NAME: DFTM Trap Manufacture & Distribution

LEADER: Scrivner

LEADER ROLE: Conduct, coordinate, and provide oversight.

PROJECT OBJECTIVE: To coordinate the manufacture and distribution of pheromone traps to western Regions and State cooperators in support of the Douglas-fir tussock moth early warning detection system.

BACKGROUND/RATIONALE: FHTET-FC contracts each year with the Foothills Gateway Rehabilitation Center in Fort Collins, Colorado, for the manufacture of Douglas-fir tussock moth pheromone traps. These traps help determine outbreak potential by capturing male tussock moths during the mating season. The number of moths caught is an indication of the number of larvae that will be present the following spring and the subsequent potential for defoliation.

METHODS: FHTET-FC sends a letter to the FHP Directors of Regions 1-6 in January, asking their FHP staffs to contact the cooperating States in the Region and submit a consolidated order for pheromone traps to FHTET-FC. FHTET-FC then orders the following materials for the traps: flat milk cartons, Tangle Trap (a sticky adhesive that traps the moths attracted by the pheromone), twist ties (used for hanging the traps), and pheromone. The pheromone is manufactured by Phero Tech Inc., a Canadian company that manufactures insect management products; Phero Tech has coordinated its development of the pheromone with the Forestry Sciences Lab in Corvallis, Oregon. Foothills Gateway picks up the milk cartons and Tangle Trap and manufactures, packs, and ships the traps. FHTET-FC then sends the pheromone, twist ties, and survey forms to field units.

PRODUCTS AND DELIVERY DATES:

Traps (approx. 7000) sent to field units	June 1996
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START/END DATES: Ongoing

COOPERATORS: Regions 1-6 and States in these Regions.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Scrivner	6 weeks
Funding	\$15,000

PROJECT NO.: C1

PROJECT NAME: Remote Sensing Support for Acquisition of Imagery

LEADER: Myhre

LEADER ROLE: Conduct and provide oversight.

PROJECT OBJECTIVE: To provide services and support to the field for acquisition of remotely sensed data in support of forest health monitoring programs and other resources activities.

BACKGROUND/RATIONALE: This remote sensing service and support activity, in effect for a number of years within FHP/FHTET-FC, provides an aerial platform for development and testing of new remote sensing systems and techniques, and provides an image acquisition service for the field in support of pest management detection and monitoring surveys. This program has played a major role in the development and implementation of the Airborne Video image Acquisition System developed by FHTET-FC. With the growing interest and demand for remote sensing in Forest Health Monitoring, the needs for this service and support capabilities is bound to increase.

METHODS: In cooperation with R-2 Fiscal and Aviation Management staffs, the Remote Sensing Services Team (RSST) at FHTET-FC will maintain a program of remote sensing development and support utilization of the FS Beechcraft King Air remote sensing aircraft. RSST will also provide an aerial platform (King Air) for developmental/test flights for evaluation of new sensor technologies.

RSST will work with customers/users requesting support to determine their needs, provide remote sensing consultation, and design an airborne mission plan for acquisition of aerial photography or airborne videography. A total service package will be provided to the customer, including mission cost estimation and planning, acquisition of imagery, purchasing and processing of film, preparing index maps, and delivery of end products. The total RSST operation (aircraft costs, salaries for pilot and photographer, per diem, film, and film processing) will be covered by enterprise funds from customers.

PRODUCTS AND DELIVERY DATES:

Operating procedures and costs established	January 1996
Special RSST account for receiving funds from users and paying operating expenses established	January 1996
Mission flight schedule for summer 1996 developed	May 1996
Mission planning, funds transfer, airborne operations	through Sept. 1996
Missions completed and products delivered	October 1996

START/END DATES: Ongoing

COOPERATORS: R-2 Fiscal and Aviation Management staffs; Rocky Mountain Station Budget and Finance; customers from various FS units and other agencies.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Myhre	12 weeks
Funding	\$38,000 (\$22,500 covered by enterprise funds)

PROJECT NO.: C2**PROJECT NAME:** Remote Sensing Technologies Training**LEADER:** Myhre**LEADER ROLE:** Conduct and cooperate.

PROJECT OBJECTIVE: To provide a series of training courses on remote sensing technologies to FHP personnel. These training courses will be designed to improve current operational techniques and to enhance job skill of field personnel.

BACKGROUND/RATIONALE: As the number of remote sensing systems has increased nationwide, the need for additional training has been expressed by a number of FHP field units and personnel. To meet these needs, FHTET-FC will plan and conduct three training courses in FY96. With input from FHP field personnel, course curriculums will be designed to meet their specific training needs and objectives.

METHODS: The approach will be to develop training curriculums, prepare training materials, and conduct the training courses. FHTET-FC will conduct:

1. Aerial Pest Detection and Monitoring. This course will cover all the remote sensing tools and related technologies, and how they may be integrated into FHP's operational aerial survey programs. This will be a cooperative effort with the Remote Sensing Applications Center (RSAC) and various FHP field units.
2. Aviation Management and Safety for FHP. This course will cover the basics of aviation, aviation management and regulations, flight operations and safety, and procedures for FHP survey flights. This will be a cooperative effort with Aviation Management/NIFC (Boise), and aerial survey specialists from Region/Area FHP staffs.
3. Photo Interpretation for Hardwood Forest Health Survey. This course will utilize the FHP Photo Interpretation Manual with some modifications to tailor the course specifically to the Vermont statewide hardwood survey, which was flown with aerial photography in August, 1995. This will be a cooperative effort with FHP/Durham Field Office, RSAC, and the State of Vermont Department of Forests, Parks, and Recreation.

PRODUCTS AND DELIVERY DATES:

Photo Interpretation for hardwood survey course	November 1995
Aerial Pest Detection and Monitoring course	March 1996
Aviation Management and Safety for FHP course	April 1996

START/END DATES: FY96**COOPERATORS:** (See Cooperators listed with each course under "Methods" section.)**RESOURCE REQUIREMENTS (FHTET-Fort Collins):**

Myhre	8 weeks
Funding	\$13,000

PROJECT NO.: C3

PROJECT NAME: Airborne Video System Users Guide

LEADER: Myhre

LEADER ROLE: Conduct.

PROJECT OBJECTIVE: To amend and update the Airborne Video System Users Guide to include the new developments for automated digital mosaicking of video imagery.

BACKGROUND/RATIONALE: The airborne video image acquisition system developed by FHTET-FC has been upgraded to include new components for acquiring data needed for automating the video image processing procedures. Two new components have been incorporated into the existing system: a digital attitude (tip-roll) sensor and a digital encoder that synchronizes GPS data, tip-roll data, and video exposure onto the video tape. This data is then used to drive the automated mosaicking process in a computer environment. This new development is ready for operational use and must be documented in the Users Guide.

METHODS: FHTET-FC will update the Users Guide will be updated with new chapters and/or amended chapters, as appropriate, addressing the use of each new component, how to assemble the new configuration, installing the system in an aircraft, and updated airborne operations. A chapter will also be prepared for image processing users on how to use the new automated mosaicking software.

PRODUCTS AND DELIVERY DATES:

New wiring diagrams for the system	January 1996
Draft of new and amended chapter	March 1996
Final version of chapters	June 1996
Printing and distribution	September 1996

START/END DATES: FY96

COOPERATORS: Dave Linden, Colorado State University.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Myhre	6 weeks
Funding	\$20,000

PROJECT NO.: C4

PROJECT NAME: Vegetative Cover and Fire Fuels Database

LEADER: Pywell

LEADER ROLE: Coordinate

PROJECT OBJECTIVE: To develop, in cooperation with Region 2, Arapaho-Roosevelt National Forest, Missoula Fire Lab, and Colorado State University, a vegetative cover and fire fuels database for the state of Colorado from LANDSAT imagery that is suitable for conducting broad-scale ecosystem management analysis (and that may also provide data on insect and disease host types for Colorado).

BACKGROUND/RATIONALE: This database could provide for future change detection analysis of vegetation stress. This project was initiated by the Renewable Resources Staff in Region 2 and the Forests of northern Colorado and southern Wyoming. FHTET-FC was asked to participate because of our expertise in remote sensing, and the cooperators interest in looking at the possibility of detecting insect and disease problems with LANDSAT imagery.

METHODS:

PRODUCTS AND DELIVERY DATES:

Land cover maps of five LANDSAT scenes covering CO and WY	October 1995
Fire models working from above database for	
Arapaho-Roosevelt National Forest	April 1996
User-friendly interface for ARNF	October 1996
Model validation for multiple locations	April 1997
Product delivery to all involved Forests	September 1997

START/END DATES: FY96 - FY97

COOPERATORS: Cuthbertson, ARNF; Tarum, ARNF; Neelan, Routt NF; Kramer, Routt NF; Hines, Medicine Bow NF; Mullen, R2-RRSU; Dean, CSU.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Pywell	1 week
Funding	\$2,5000

PROJECT NO.: C5

PROJECT NAME: Airborne Sensor Evaluation and Development

LEADER: Pywell

LEADER ROLE: Cooperate.

PROJECT OBJECTIVE: To evaluate, in cooperation with Regions/Area and RSAC, new sensor technologies, such as multispectral video and digital photographic systems for forest vegetation stressor detection.

BACKGROUND/RATIONALE: This evaluation would serve three purposes: 1) collect information on spectral and spatial characteristics of specific stressors; 2) evaluate existing sensor technology for possible incorporation into ongoing aerial survey and forest health monitoring programs; and 3) gain needed information for future sensor development of a narrow-band/multispectral imagery acquisition system (e.g., a color-infrared video system or a multichannel sensor system with selectable filters). This task is tied to Task 3-3 of the Forest Health Technology 2000 Task Force Report of June 14, 1994.

METHODS: The approach will be first to select several groupings of stressors (e.g., bark beetles, conifer or hardwood defoliators, root diseases) for the evaluation. Then, FHTET-FC will install new sensors in an aircraft already equipped with existing technology (such as a color video camera and/or aerial camera systems). This will also provide a comparison between existing sensor imagery and the test systems. Image interpretation and analysis will be done, to the extent possible, by FHP field units.

PRODUCTS AND DELIVERY DATES:

Image acquisition	August 1996
Image interpretation	October 1996
Evaluation report	December 1996

START/END DATES: Ongoing

COOPERATORS: Bobbe, Ishikawa, and Alban, RSAC; Knapp and Munson, Region 4; Frament, Northeastern Area; Levien, Region 5; Silvey, NF in Texas.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Pywell	8 weeks
Myhre	4 weeks
Funding	\$62,500

PROJECT NO.: C6

PROJECT NAME: Automated Mosaicking Development and Implementation

LEADER: Pywell

LEADER ROLE: Cooperate.

PROJECT OBJECTIVE: To complete, in cooperation with RSAC, Region 8, Northeast Area, and Colorado State University, the development and implementation of the automated mosaicking capability hardware and software for existing field-deployed airborne video systems and the Kodak digital frame camera, including the integration of a 3-axis attitude sensor and encrypted-GPS receivers.

BACKGROUND/RATIONALE: Through a Cooperative Agreement with Colorado State University, FHTET-FC has developed and implemented hardware and software that permits the automatic geo-referencing and mosaicking of video imagery using GPS data and data collected from a 2-axis attitude sensor installed in the aircraft. The system works quite well, and saves considerable time in mosaicking video images, making the video system far more useful. The purpose of this task is to incorporate a 3-axis attitude sensor into the system to improve the positional accuracy of the resultant mosaic, and to evaluate the possibility of integrating this technology with the new Kodak digital camera.

METHODS: The work will be done through a Cooperative Agreement with Colorado State University with collaboration from RSAC and the Eastman Kodak Company.

PRODUCTS AND DELIVERY DATES:

Integration of 3-axis attitude sensor	March 1996
Software to incorporate 3-axis sensor	June 1996
Update manuals and user guide	September 1996
Feasibility report for integration with digital camera	September 1996

START/END DATES: FY96

COOPERATORS: Hoffer and Linden, Colorado State University; Bobbe, Ishikawa, and Alban, RSAC; Hosking and Thorn, New Zealand Forest Research Institute; Eastman Kodak Company.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Pywell	4 weeks
Myhre	2 weeks
Funding	\$28,000

PROJECT NO.: C7

PROJECT NAME: Classified Sensor Evaluation

LEADER: Pywell

LEADER ROLE: Coordinate.

PROJECT OBJECTIVE: To evaluate, in cooperation with Engineering and other Federal agencies, the utility of various classified sensors for potential declassification and application to forest health monitoring.

BACKGROUND/RATIONALE: The Federal government is in the process of evaluating the utility of various spaceborne sensors for their utility in civilian applications and possible declassification. Some sensors may have application to forest health monitoring.

METHODS: Evaluation and report as appropriate.

PRODUCTS AND DELIVERY DATES:

Evaluation report

September 1996

START/END DATES: Ongoing

COOPERATORS: Bobbe, RSAC; Dull, WO-Engineering; other Federal agencies.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Pywell	4 weeks
Funding	\$4,000

PROJECT NO.: C8**PROJECT NAME:** Remote Sensing Integration, Development, and Implementation**LEADER:** Pywell**LEADER ROLE:** Cooperate.**PROJECT OBJECTIVE:** To develop and implement, in cooperation with FHP field units and RSAC, a strategy for integrating existing remote sensing technologies into FHP's operational aerial survey program.**BACKGROUND/RATIONALE:** Aerial surveys have been, and will continue to be, a useful and cost effective method of acquiring information on the health of the nation's forests. Each year, 57 aircraft and over 100 people accumulate over 2,900 flight hours acquiring data on insect and disease occurrence. While this data is extremely useful, its quality is variable and its accuracy, in most cases, is unknown.**METHODS:** This task will include evaluating FHP remote sensing capabilities, evaluating personnel capabilities, developing sampling systems as appropriate, and developing remote sensing training courses. This will result in more efficient, cost-effective, and accurate aerial survey data, and standardization between Regions.**PRODUCTS AND DELIVERY DATES:**

Develop a remote sensing course for FHP aerial survey personnel	November 1995
Conduct the remote sensing course	April 1996
Assist in the development of an aviation safety course for FHP aerial survey personnel	April 1996
Develop a strategy for implementing remote sensing into the aerial survey program	September 1996
Evaluate tools, such as electronic moving map displays, for incorporation into the aerial survey program	September 1996

START/END DATES: FY96 - FY97**COOPERATORS:** Caylor, Bobbe, and Lachowski, RSAC; FHP Regions/Area.**RESOURCE REQUIREMENTS (FHTET-Fort Collins):**

Pywell	5 weeks
Myhre	3 weeks
Smith	2 weeks
Funding	\$16,000

PROJECT NO.: D1

PROJECT NAME: Model Maintenance and User Support

LEADER: Adams

LEADER ROLE: Conduct.

PROJECT OBJECTIVE: To provide, in cooperation with WO-TM, INT, RM, and Regional and university model contacts, maintenance and user support for the western insect and pathogen simulation models and their links to the Forest Vegetation Simulator (FVS) model variants.

BACKGROUND/RATIONALE: Insect and pathogen models are developed by Research, FHTET-FC, and other cooperators/contractors for use by Forest Service employees, states, and private individuals. FHTET then has responsibility for establishing and maintaining the models on the Forest Service Data General and the Project 615 system, and for providing efficient and effective user support for the models via DG, fax, telephone, or mail. All phases of model maintenance and user support require coordination with the WO-TM Service Center staff because of the close integration of the models when linked.

With new knowledge gained from model use and research, the model program code is in a continual state of renewal and update; maintenance of the models requires a systematic approach to ensure consistency and accuracy in all programs on all systems. As computer systems become obsolete, program source code must be installed and tested on new hardware/software systems: with the delivery of the Project 615 equipment during this pilot year, the models will also be available and supported on IBM hardware.

METHODS: FHTET-FC will provide DG system insect and pathogen models to field units when requested through Regional FVS/I&P contacts. FHTET-FC will incorporate updated documents into the Information Center named Ecosystem Simulation and Analysis Tools (ESAT). ESAT provides the users with current information via the Data General system and avoids the mailing, copying, and other delays that are inherent with hardcopy distribution.

PRODUCTS AND DELIVERY DATES:

FHTET-FC will continue to provide maintenance and support for all insect and pathogen models on an ongoing basis.

START/END DATES: Ongoing

COOPERATORS: Johnson, Dixon, and Teck, WO-TM; Crookston, INT; Regional FHP and TM model contacts.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Adams	8 weeks
Scrivner	6 weeks
Funding	\$23,000

PROJECT NO.: D2

PROJECT NAME: PC Distribution of Models

LEADER: Adams

LEADER ROLE: Conduct and provide oversight.

PROJECT OBJECTIVE: To make available and support the FVS/Insect and Pathogen models on the personal computer platform; to enable retrieval of the models through a PC bulletin board system; to serve as distribution site, working in cooperation with the WO-TMSC group.

BACKGROUND/RATIONALE: Forest Vegetation Simulator and the Insect and Pathogen models have been available and supported on the Data General system for a number of years. This is an effective method for distribution to Forest Service employees, but has limited the accessibility to users outside of the agency. Requests for the models have come from universities, Bureau of Indian Affairs, state governments, timber companies, and many others. The personal computer has become the common platform among all groups; by supporting the models on this platform, the models will be available to a wide array of businesses, interest groups, and individuals.

METHODS: FVS/I&P models will be available for use on PCs through a bulletin board system. General documentation will be available for retrieval; model update/change bulletins will be posted, and requests for further documentation can be transmitted through the bulletin board.

PRODUCTS AND DELIVERY DATES:

Bulletin board system functioning	January 1996
Bulletin notices	March 1996
Keyword guides available	September 1996

START/END DATES: FY96

COOPERATORS: Johnson, Dixon, and Teck, TM; Regional contacts.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Adams	4 weeks
Roschke	2 weeks
Scrivner	2 weeks
Funding	\$13,500

PROJECT NO.: D3**PROJECT NAME:** Model Documentation: RD, WPBR, Initialization Data for Models**LEADER:** Adams**LEADER ROLE:** Coordinate, and provide oversight.**PROJECT OBJECTIVE:** To complete the User's Guide for the Western Root Disease, inclusive of the current Western Root Disease and Annosus Root Disease documentation; to begin documentation work on the White Pine Blister Rust User's Guide and the Initialization Data for Models Report.**BACKGROUND/RATIONALE:** Environmental and Social Systems Analysts, Ltd. (ESSA) has completed a contract with British Columbia Ministry of Forests to combine all the currently available root disease models (Armillaria, Phellinus, and Annosus) into one general model. The intent is to decrease the user's time commitment in running the models, as well as reduce the maintenance and support time associated with separate models. This user's guide will also include run examples from the United States and Canada, providing examples of both English and metric measurements.

The White Pine Blister Rust model is currently being beta-tested in Regions 1 and 6. For this model to continue into production, a user's guide is necessary; the pathogen background, model development process, and beta-test samples can be included in the documentation.

One of the first questions asked about the FVS/I&P models is, "What data does it require?" A report specifying and illustrating the data requirements for models would be a great resource for people to have prior to field season. This would guide them through the data collection process in preparation for analysis work involving the FVS/I&P models.

METHODS: FHTET-FC will provide a draft root disease user's guide to the core group in the United States and Canada for review and comments. Corrections and comments will be incorporated and a final version produced and distributed. FHTET-FC and Region 1 will collect white pine blister rust information. FHTET-FC will gather information from various regions on data collection procedures for the Initialization Data for Models Report.**PRODUCTS AND DELIVERY DATES:**

Western Root Disease Model	February 1996
White Pine Blister Rust Draft User's Guide	September 1996
Initialization Data for Models Report Draft	September 1996

START/END DATES: FY96**COOPERATORS:** British Columbia Ministry of Forests; Sue Hagle and John Schwandt, R1; Susan Frankel, R5; Ellen Goheen, Jerry Beatty, and Tom Gregg, R6; Gary Dixon, WO-TMSC.**RESOURCE REQUIREMENTS (FHTET-Fort Collins):**

Adams	4 weeks
Funding	\$25,000

PROJECT NO.: D4

PROJECT NAME: Dwarf Mistletoe Training Package

LEADER: Adams

LEADER ROLE: Conduct.

PROJECT OBJECTIVE: To produce a training package on the Dwarf Mistletoe Model, including slides, overheads, and presenter's notes. The package will be used for training sessions or general model overview discussions.

BACKGROUND/RATIONALE: Occasionally, FVS/I&P model training sessions are held at Regional offices to assist people involved in a conditions analysis. Training sessions require considerable time and effort to gather materials together; this effort is duplicated each time a training session is held at a different site or given by a different presenter. To eliminate this duplication, a training package will be developed and distributed to all Regions. When a training session is scheduled, the presenter can review the package for additional regional requirements; enhancements or modifications should be minor and require a minimum amount of time to complete.

METHODS: FHTET-FC will analyze the Western Root Disease Model training package for effectiveness, discussing the pros and cons of this package with presenters who have had an opportunity to use these training aides. Adjustments in the development of the Dwarf Mistletoe Model training package will be made based on the comments received from presenters.

PRODUCTS AND DELIVERY DATES:

Dwarf Mistletoe Training Package

September 1996

START/END DATES: FY96

COOPERATORS: Teck, WO-TMSC; Tom Gregg and Ellen Goheen, R6; Brian Geils, RMS; Mary Lou Fairweather, R3; Jane Taylor, R1.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Adams	2 weeks
Scrivner	3 weeks
Funding	\$8,500

PROJECT NO.: D5

PROJECT NAME: Model Users Training

LEADER: Adams

LEADER ROLE: Conduct and cooperate.

PROJECT OBJECTIVE: To provide FHP field personnel with the skills to use and assist others in the use of growth and yield/insect & pathogen simulation models in forest resource planning; assist with any specialized training needs.

BACKGROUND/RATIONALE: To increase the competence and confidence of resource managers and silviculturists in the use of insect & pathogen models, an effective training program must be established. This training program may include familiarization sessions on the abilities, limitations, and assumptions of the model(s). The I&P model training program can be conducted in cooperation with Regional Forest Vegetation Simulator (FVS) training sessions or as a separate effort focusing on advanced users' needs.

METHODS: FHTET-FC will assist the Regions in conducting training sessions for users in their area when a need is identified. The sessions include the basic FVS training and the appropriate models for that variant.

PRODUCTS AND DELIVERY DATES:

Training session

March 1996

START/END DATES: FY96

COOPERATORS: Teck, WO-TMSC; Dawn Hansen and Joy Roberts, R4; and staff in R6.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Adams	4 weeks
Funding	\$14,000

PROJECT NO.: D6**PROJECT NAME:** PTIPS Database Support & Recorder**LEADER:** Adams**LEADER ROLE:** Conduct and cooperate.

PROJECT OBJECTIVE: To integrate existing and new permanent plot data in order to improve validation, calibration, and development of pest models and pest damage estimates, as applied to outbreak behavior. This project focuses on dwarf mistletoe, root disease, western spruce budworm, white pine blister rust, and comandra rust.

BACKGROUND/RATIONALE: At the permanent plot coordination meetings in December 1989, FHP units in the West identified a need for plot data to improve the validation/calibration/development of pest models applied to outbreak behavior. A database application has been developed and is currently in beta test mode.

METHODS: The Pest Trend-Impact Plot System (PTIPS) database application system has been installed at beta test sites for a year, with changes and enhancements being identified. Following an informational session on the updates, version 2.1 will be released to the Regions for installation. FHTET-FC will continue technical support, assisting Regions with the implementation process. Through this support, further changes can be identified. After discussion and approval by the cooperators, modifications will be prioritized and integrated into future releases.

Basic requirements for a recorder will be researched with the cooperation of WO-TMSC and the Regions. A recorder program incorporating a data validation routine for use during data collection in the field will be developed.

PRODUCTS AND DELIVERY DATES:

Information session to discuss updates	October 1995
Identified changes and enhancements for Version 3.0	October 1995
Version 2.1 will be released	December 1995
Conversion to Project 615 platform	September 1996
Recorder program	September 1996

START/END DATES: Ongoing

COOPERATORS: R1-FHP; R2-FHP; R3-FHP; R4-FHP; R5-FHP; R6-FHP; R10-FHP; INT; WO-TMSC; RMS; PNW.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Adams	6 weeks
Funding	\$62,000 (\$60,000 covered by enterprise dollars)

PROJECT NO.: D7

PROJECT NAME: Pest Model Interface Development

LEADER: Janiga

LEADER ROLE: Conduct, cooperate, and coordinate.

PROJECT OBJECTIVE: To develop, in cooperation with the developers of FVS, an interface that enables users to interact with FVS and the pest models via Project 615 systems and MS-WINDOWS.

BACKGROUND/RATIONALE: The cooperators in this project have been devising an interface for Project 615 systems and MS-Windows to the Forest Vegetation Simulator and pest model extensions over the past year. The IBM 6000/MS-Windows interface has been under development by the Intermountain Experiment Station. End-user involvement in this version has been limited. Direct feedback from FVS users and pest model specialists is needed in order to keep the scope of the project pertinent to high priority capabilities needed by the user community. Work in fiscal year 1996 will focus on delivering a completed version 1.0 of the interface with user guide(s), graphic display of model results, and a description of the design and coding plans for future versions to be produced through 1999.

METHODS: FHTET-FC will prioritize project activities through a series of meetings among the cooperators, and identify the criteria for most crucial functionalities for the interface. Each pre-release version will be used in small group evaluation and feedback sessions (two or three) with end-users. FHTET-FC will design a core system and satellite components for potential programming by remote cooperators; work by "data display" developers will be coordinated with other teams to ensure the compatibility of resulting products.

PRODUCTS AND DELIVERY DATES:

Useability review session	January 1996
Engineering of DOS-based submittal system interface	March 1996
User forum and alpha test release of version 1.0	August 1996
Annual cooperator project review and plan revision	August 1996

START/END DATES: FY96 - FY97

COOPERATORS: Gary Dixon, TMSC-WO; Nick Crookston and Melinda Moeur, INT; Tommy Gregg, and Kathy Sheehan, R6.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Janiga	10 weeks
Adams	4 weeks
Williams	8 weeks
Funding	\$55,500

PROJECT NO.: D8

PROJECT NAME: West Wide Pine Beetle Model Implementation

LEADER: Smith

LEADER ROLE: Conduct and provide oversight.

PROJECT OBJECTIVE: To operationalize the West Wide Pine Beetle Model for use on landscape-level ecosystem management and forest health protection projects.

BACKGROUND/RATIONALE: FHTET-FC cooperated with R-4 in developing a west wide pine beetle through TDP funding. The model was developed using limited data sets. In order to operationalize the model for widespread use, additional data sets must be tested and results reviewed by knowledgeable field staffs. Our strategy for implementation is to work closely with a few advanced users on specific projects to work out any unforeseen problems. Also, the multi-stand model will be much more convenient to use when linked to Project 615 software.

METHODS: Complete the sensitivity testing, integration of the fire module, completion and updating of documentation, publication of West Coast validation efforts, release of the model through the FVS system and other elements of this task. Expansion of the model to include other beetle species will be evaluated for future project development.

PRODUCTS AND DELIVERY DATES:

Black's Mountain mixed conifer calibration:

Initial model results

May 1996

Workshop to review results

September 1996

Lodgepole Pine type (R-1 or R-2) demo project:

Project plan

June 1996

START/END DATES: FY96

COOPERATORS: Bill Schaup, R-2; John Wenz, R-5; Tom Gregg, R-6; Pat Shea and George Ferrell, PSW; Jesse Logan, INT.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Smith	6 weeks
Adams	1 week
Funding	\$19,000

PROJECT NO.: D9

PROJECT NAME: Multipest Model Development

LEADER: Smith

LEADER ROLE: Conduct and provide oversight.

PROJECT OBJECTIVE: To produce a usable pest modeling system that considers the total impact of pests on a forest over time. The near-term objective of this work is to build and test one or more prototype solutions for this problem.

BACKGROUND/RATIONALE: Current pest model extensions cannot be run simultaneously as the software is not designed to operate in this way. In addition, the biological information on the interactions between pests has not been gathered, analyzed, or both. Previous planning efforts have identified this multipest capability as a very high priority project.

METHODS: FHTET-FC will conduct a workshop of entomologists, pathologists, and related specialists to determine a workable scope and structure for modeling the biology of multiple pests, to identify a forest type or area to model with a prototype, and solicit input concerning the scope of a contract or cooperative agreement for completing model development. The contents of any resulting cooperative agreement will be based on this input.

PRODUCTS AND DELIVERY DATES:

Model design workshop	June 1996
Contract/coop: Agreement	August 1996
Study plan	September 1996

START/END DATES: FY96

COOPERATORS: Tom Gregg and Kathy Sheehan, R-6; Jim Byler, R-1; Borys Tkacz, R-3; John Wentz, R-5; Bill Schaup, R-2; Melinda Moeur, INT; Dave Wood and Don Dahlsten, UCB.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Smith	6 weeks
Funding	\$64,000

PROJECT NO.: D10

PROJECT NAME: Multi-Resource Model Support

LEADER: Smith

LEADER ROLE: Cooperate.

PROJECT OBJECTIVE: To provide support and coordination for multi-stand and multi-resource modeling efforts led from outside of FHTET.

BACKGROUND/RATIONALE: The Forest Vegetation Simulator (FVS) is being expanded to incorporate model elements from fire management and fire ecology, wildlife habitat, and other non-timber resource areas. Most of these resource concerns are either impacted by pests, impact pest conditions, or both. FHTET-FC has been an active leader and participant in the effort to integrate these new models into FVS. The current fire model is being designed to operate using major portions of the code developed by FHTET-FC for the West Wide Pine Beetle Model.

METHODS: Participate in a Fire Model extension development and provide forest health input into FVS-habitat modeling extension and related efforts. FHTET-FC will actively seek partnerships in this area.

PRODUCTS AND DELIVERY DATES:

Combined Bark Beetle—Fire Multistand Model Prototype
Wildlife habitat cooperation

January 1996
As required by cooperators

START/END DATES: Ongoing

COOPERATORS: Nick Crookston, Colin Hardy, and Elizabeth Reinhardt, INT; Rich Teck, TM.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Smith	4 weeks
Funding	\$2,000

PROJECT NO.: D11

PROJECT NAME: Model Sensitivity, Validation, and Calibration

LEADER: Smith

LEADER ROLE: Conduct, cooperate, and provide oversight.

PROJECT OBJECTIVE: To systematically test pest model behavior and results and in order to provide appropriate parameters for operating the models over a wide range of conditions.

BACKGROUND/RATIONALE: Pest models receive some testing when they are developed, but usually on a very limited range of data. In some cases, FHTET-FC and its cooperators have done more extensive subsequent sensitivity testing for new models; the PTIPS database system was designed to organize pest plot information to allow for more complete model validation and calibration. This project will create an organized framework for testing so that FHTET-FC can begin testing models in a systematic fashion.

METHODS: Review the validation, calibration, and sensitivity analysis status of the pest models; design and begin to implement a systematic approach to performing this work on the models. A follow-up to the model user survey will be used to identify potential cooperators for such work and to prioritize tasks. Perform the sensitivity analysis for the Annosus Model TDP (enterprise funding).

PRODUCTS AND DELIVERY DATES:

Annosus (assuming that the model is finished in May 1996)	
draft analysis	August 1996
final analysis	February 1997
Status Review Plan	May 1996
draft report	July 1996
final report	September 1996

START/END DATES: Ongoing

COOPERATORS: Susan Frankel, R-5; Dave Johnson, R-2; Sue Hagle, R-1; Bruce Hostetler and Ellen Goheen, R-6; Borys Tkacz, R-3.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Smith	6 weeks
Adams	3 week
Funding	\$62,500
	(\$62,500 covered by enterprise dollars)

PROJECT NO.: D12

PROJECT NAME: Pest Model Output Display

LEADER: Pywell

LEADER ROLE: Cooperate.

PROJECT OBJECTIVE: To continue development, in cooperation with Regional FHP offices, Timber Management Service Center, Intermountain Station, Missoula Fire Lab, and the universities of Arizona and Illinois, of a visual output component for forest insect and disease models that will allow the display of pest impacts, forest fuels, and forest management alternatives, and develop an interface of these capabilities with INFORMS and the Forest Vegetation Simulator (FVS).

BACKGROUND/RATIONALE: Data visualization techniques have proven valuable in displaying possible future forest conditions to both resource managers and stakeholders. Through these techniques, stand data, model outputs, and management actions can be displayed in a meaningful way. Pest model users and participants in model interface development have emphasized the importance of improving the display of model results in order to better communicate pest risk and impact.

METHODS: Timber Management Service Center, Region 6, and PNW are cooperating in an ongoing project to graphically portray FVS output using MS-Windows-based software; a technology development project with Region 4 is completing version 1.0 of a Project 615-based system that provides graphic depiction and interface with vegetation and pest models. The pest model interface project at FHTET-FC will be coordinated with these projects by having all teams collaboratively formulate recommendations for display development. The results of these projects will be used in meetings, papers, and demonstrations in order to garner support beyond FHP for the continued development and application of data visualization techniques.

PRODUCTS AND DELIVERY DATES:

Continued development support

September 1996

START/END DATES: FY96 - FY97

COOPERATORS: Orland, University of Illinois; Johnson and Teck, TMSC; Daniel, University of Arizona; Crookston, Intermountain Station; Wells, WO-Timber; New Zealand Forest Research Institute.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Pywell	5 weeks
Janiga	2 weeks
Funding	\$25,000

PROJECT NO.: D13

PROJECT NAME: Biometrics Support

LEADER: Smith

LEADER ROLE: Cooperate and provide oversight.

PROJECT OBJECTIVE: To provide statistical support and consulting to field units, including project reviews and self-support training opportunities.

BACKGROUND/RATIONALE: FHTET-FC has maintained a support function in supplying statistical support to field units. In the past, this has included training, advice and assistance in software acquisition, consultation in data analysis, review of study plans and analyses, and participation on Regional project teams. Currently, the staff biometrician is serving on a national committee of FS statisticians chartered by the CIO to assist in the selection and acquisition of statistical software for Project 615 computers. Field assistance has been shown to be a useful and often necessary component in FHP studies.

METHODS: Consulting on an as-needed basis, including Vermont analysis (enterprise funded). Coordinate with other FS biometricians for software, training, and other support services

PRODUCTS AND DELIVERY DATES:

Vermont (dependent on data availability from State):	
study plan	August 1996
draft analysis	FY97
final analysis	FY97
R-3 Blister Rust: Study Plan	November 1995
National Project 615 Statistics Software Committee:	
draft RFI to FS CIO	December 1995
Consulting and Reviews	Ongoing, as requested

START/END DATES: Ongoing

COOPERATORS: Mark Shultz, R-3; Rudy King, RM; Tim Max, PNW; Ron Kelly, State of Vt.; others as need develops.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Smith	8 weeks
Funding	\$35,500

PROJECT NO.: D14

PROJECT NAME: Landscape Assessment Methodology

LEADER: Williams

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: To complete development, in cooperation with Region 1, of a landscape assessment methodology and then begin testing and refining this methodology in Region 5 and/or Region 6.

BACKGROUND/RATIONALE: Forest Service planning processes are in a state of rapid change. All Regions are defining new planning methodologies that embrace ecosystem management concepts. In order for Forest Health (FH) staffs to be active participants in these emerging planning processes, new methodologies for assessing the role and impact of insects, pathogens, and other agents on ecosystems must be developed. FHTET-FC is assisting Region 1 on a TDP project to develop such methodologies. Knowledge and results from this effort will be applicable to other Regions and will provide needed insight and direction in addressing two long-term FHTET initiatives defined in the "Forest Health 2000" reports. These needs include the need to develop landscape-level forest health models and the need for multi-agent models.

METHODS: FHTET-FC's role includes providing advice and direction on data acquisition, performing data management and data manipulation tasks, providing expertise in Geographic Information Systems (GIS) processing, assisting in development of model parameters and in performing model runs, and assisting in the preparation of documentation and reports. Where possible, FHTET-FC will automate forest health assessment processes so that this methodology is usable by both other Regions and by District- and Forest-level staff. FHTET-FC will assist in testing and refining this methodology in Region 5 and/or Region 6.

PRODUCTS AND DELIVERY DATES:

Documents describing methodology and initial results	May 1996
Prototype ArcView-based application for performing landscape assessments	May 1996
Descriptive statistics and other assessment reports on National Forests in R1	May 1996
Model parameters sets and automated routines	May 1996
Self-sufficiency by R1 staff to perform landscape-level analyses	June 1996
Data, routines, and reports resulting from initial transfer activities in R5 and/or R6	Sept. 1996

START/END DATES: FY96

COOPERATORS: Byler and Hagle, R1 FHP; Frankel, R5; E. Goheen, R6.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Williams	14 weeks
Pywell	2 weeks
Smith	2 weeks
Adams	1 week
Funding	\$113,500 (\$65,000 covered by enterprise dollars)

PROJECT NO.: D15

PROJECT NAME: PTIPS Database Changes to AllVeg/PTIPS

LEADER: Adams

LEADER ROLE: Conduct and cooperate.

PROJECT OBJECTIVE: To modify the PTIPS database structure to an AllVeg/PTIPS database structure.

BACKGROUND/RATIONALE: A number of Regions (R1, R6, R5, R4) have expressed an interest in using the AllVeg database structure for their inventory data. This database was developed from the PTIPS structure, with modifications to accommodate different inventory designs, specific Regional information, and other data collection needs. Having one structure would simplify work for the Regional timber group, Forest Health Protection staffs, and the computer systems support staff. The benefits from one structure will reduce duplication of work on applications, load programs, statistical reports, etc.

METHODS: Agreement has been reached on the database structure. The WO-TMSC staff is developing load programs for Region 5 with this new structure. The conversion from the PTIPS structure to the new AllVeg/PTIPS design and a corresponding data dictionary will be accomplished by the FHTET-FC.

PRODUCTS AND DELIVERY DATES:

Changed database
Data Dictionary

November 1995
January 1996

START/END DATES: FY96

COOPERATORS: Ralph Johnson, Gary Dixon, Roy Mita, and Tonya Smith, WO-TMSC; Ralph Warbington, R5.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Adams	6 weeks
Funding	\$30,000 (\$30,000 covered by enterprise dollars)

PROJECT NO.: E1

PROJECT NAME: Region 8 Forest Health Rulebase Toolkit

LEADER: Williams

LEADER ROLE: Cooperate and provide oversight.

PROJECT OBJECTIVE: To provide timely oversight and consultation to Region 8 personnel in their effort to develop a Rulebase Toolkit; to facilitate the transfer of this technology to other Regions.

BACKGROUND/RATIONALE: FHP has funded a Region 8 Technical Development Proposal (TDP). This TDP should yield a Rulebase Toolkit software product that will allow end-users to easily construct rulebases to help identify appropriate management activities during project planning. The early version of this toolkit is now actively being used, and has generated substantial interest among Forest Service and non-Forest Service individuals. FHTET-FC has been involved with decision support technologies that include a rulebase component, and has considerable knowledge related to the need and use for rulebases in forest management planning. FHTET-FC has been asked by R8 to help in conducting this project by providing guidance and oversight during the 3-year lifespan of this project. In addition to the benefit gained by R8, FHTET-FC's participation will allow important rulebase concepts to be gleaned for future incorporation into other FHTET-FC decision support efforts.

METHODS: FHTET-FC will attend key project review meetings during the year and provide oral and written advice on technical issues. FHTET-FC may occasionally review critical documentation and program code produced by Texas A&M University, the principal investigator on this project. FHTET-FC's role includes co-development of requirements and design specifications, setting schedules, assisting user sites, testing toolkit versions, championing software development standards (including adherence to Forest Service standards), and assistance in documentation.

PRODUCTS AND DELIVERY DATES:

Oral responses, letters, written evaluations, and	
reports as negotiated between R8 and FHTET-FC	September 1996
Rulebase Toolkit implemented on INFORMS-R8 user sites	September 1996

START/END DATES: FY96 - FY97

COOPERATORS: R8 and Texas A&M University.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Williams	5 weeks
Funding	\$19,000 (\$8,000 covered by enterprise dollars)

PROJECT NO.: E2

PROJECT NAME: INFORMS Reengineering: Sun Platform to Project 615 Platform

LEADER: Williams

LEADER ROLE: Cooperate and provide oversight.

PROJECT OBJECTIVE: To reengineer INFORMS-R8 from the Sun Workstation to the IBM Workstation using related Project 615 software.

BACKGROUND/RATIONALE: FHTET-FC has cooperated with R8 FHP since 1990 to build a workstation prototype of INFORMS. The system is now operational on two R8 sites and is being tested in R6 on one site. The current system is well liked by end-users and represents a means to further improve the system. With Project 615 now awarded and implementation underway, the time has come to move this DSS project to fruition by reengineering INFORMS-R8 for the Project 615 platform. This reengineering will make use of Project 615 software, and will incorporate final improvements in the INFORMS-R8 system to allow broad use across the FS. Individuals from Regions 1, 2, 5, and 6, and other forests in Region 8 have expressed substantial interest in the system, and this reengineering effort will position the system for implementation on these sites. The level of interest in INFORMS-R8 is reflected by the time and co-funding provided by our end-users.

METHODS: This effort provides FHTET with the opportunity, not simply to implement INFORMS-R8 on the Project 615 platform, but to improve the existing INFORMS-R8 prototype based on lessons learned at three user sites and soon-to-be-completed detailed requirements documentation. A detailed work plan is contained within a Coop Agreement with Texas A&M University: Texas A&M will perform the primary technical work, while cooperators will assist in developing the Analysis and Design specifications. FS cooperators (including FHTET) will support documentation and testing. The reengineered INFORMS framework will be built to accommodate identified planning functions, with key functions operational by the end of FY96.

PRODUCTS AND DELIVERY DATES:

INFORMS-R8 operational on Project 615 platform	September 1996
INFORMS-R8 operational on 3 districts	September 1996
Supporting documentation	November 1996

START/END DATES: FY96

COOPERATORS: Texas A&M staff; R8 Forest Health staff; Ouachita NF staff; Jessieville RD staff; Neches RD staff; and Eric Twombly from the Pine RD in R6. Potential partners in R1, R2, and R5: to be determined as the beta version is implemented.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Williams	8 weeks
Roschke	2 weeks
Funding	\$89,500 (\$20,000 covered by enterprise dollars)

PROJECT NO.: E3

PROJECT NAME: Landscape-Level Assessment: INFORMS Integration

LEADER: Williams

LEADER ROLE: Facilitate and provide oversight.

PROJECT OBJECTIVE: To incorporate the landscape assessment queries and other relevant spatial analysis routines and reporting routines within the reengineered INFORMS framework in order to both test the flexibility of INFORMS and to demonstrate the utility of the INFORMS DSS.

BACKGROUND/RATIONALE: INFORMS specification, testing, and development has been ongoing since 1990. With Project 615 implementation, INFORMS will be reengineered and enhanced to represent what is envisioned to be a broadly implementable product that supports project and landscape-level planning. For example, in 1994, a TDP initiated in R1 to define a methodology for assessing the role of insects and pathogens in forest succession yielded software routines capable of producing output in support of FS planning at many scales. R1 has expressed a desire to incorporate these routines into a user-friendly application for use by District- and Forest-level staffs, as well as Regional FHP staff. In order to support the TDP, FHTET-FC will produce an initial prototype application based on ArcView and Oracle to demonstrate how such routines can be easily utilized to support planning and to provide an initial, usable, needed product.

METHODS: In cooperation with Texas A&M University and in consultation with Region 1, FHTET will integrate the landscape assessment queries and report utilities within the reengineered INFORMS. This task will be done in conjunction with reengineering INFORMS, and thus will promote a more rigorous design of INFORMS and provide a good test of its flexibility. Contract staff responsible for the assessment routines will attend key INFORMS meetings to understand design concepts, and then will add appropriate INFORMS menu choices and encode the needed linkages to the assessment routines. These routines will have already been developed as a result of the R1 TDP. FHTET-FC will demonstrate the utility of this integration to R1 as well as other Regional staffs. The intent is to eventually use INFORMS as the interface for performing these landscape assessments in R1 and any other Regions joining the landscape-level assessment project.

PRODUCTS AND DELIVERY DATES:

Function queries integrated within INFORMS	July 1996
Report generation queries integrated within INFORMS	July 1996
Spatial analysis routines integrated within INFORMS	September 1996
INFORMS w/ integrated routines demonstrated to R1 and other partners	September 1996

START/END DATES: FY96

COOPERATORS: Texas A&M; R8 FHP staff; R1 FHP staff. Potential cooperation with R5 & R6 FHP staff.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Williams	1 week
Funding	\$19,500

PROJECT NO.: E4

PROJECT NAME: Suppose... Integration with INFORMS

LEADER: Williams

LEADER ROLE: Facilitate and provide oversight.

PROJECT OBJECTIVE: Through prototyping and discussion, to explore and document integration issues involved with integrating Suppose... within the INFORMS framework; to identify integration strategies to guide formal linkage of Suppose... to INFORMS once both systems are more stable.

BACKGROUND/RATIONALE: This task will create a model linkage framework, demonstrated by integrating one or two resource models identified by project sponsors. However, the current “first cut” of Suppose... is not stable or mature enough to warrant integration into an INFORMS version to be implemented by the end of FY96. Yet, eventual integration of Suppose... with INFORMS is essential since all western Regions use FVS, a model integral to Suppose..., and integration within INFORMS will provide better value to western users of INFORMS. (For example, TM is in the process of establishing a model variant within FVS for parts of Region 8.) Existing INFORMS user sites within R8 will be more likely to adopt FVS (as represented within Suppose...) if it is available through INFORMS. Although Suppose... may not initially be integrated within INFORMS by Texas A&M, it is important in the long run to start exploring how this integration should be accomplished in order to guide Texas A&M design decisions and to lay the groundwork for rapid integration once Suppose... development is at a suitable stage.

METHODS: With the cooperation of the appropriate Suppose... analysts and developers, FHTET-FC staff will test integration of Suppose... within the ArcView prototype of INFORMS. Initial meetings to discuss issues between FHTET-FC staff will provide design criteria for prototyping these requirements within the ArcView INFORMS prototype. Ideas and issues from this effort will be transmitted to Texas A&M to ensure a robust design for the resulting INFORMS system. This prototyped integration will then be used by FHTET-FC and cooperators to facilitate documentation of issues, ideas, and potential design solutions.

PRODUCTS AND DELIVERY DATES:

Suppose... Alpha version integrated within prototyped ArcView INFORMS	April 1996
Documents describing issues, concerns, and ideas sent to Texas A&M	May 1996
Document discussing this exercise, the issues involved, prototype conclusions, and potential future strategies	August 1996

START/END DATES: FY96

COOPERATORS: WO-TM; Eric Twombly, R6; Texas A&M. Other FHP staff may be consulted, such as Tommy Gregg and Sue Hagle.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Williams	1 week
Adams	2 weeks
Janiga	2 weeks
Funding	\$11,500

PROJECT NO.: E5

PROJECT NAME: GypsES Status Evaluation

LEADER: Williams

LEADER ROLE: Facilitate, provide oversight.

PROJECT OBJECTIVE: To formally evaluate the status of the GypsES Decision Support System to produce a plan of action for potential re-engineering and future distribution and maintenance.

BACKGROUND/RATIONALE: GypsES, a DSS to support control and management of the gypsy moth impact on forest vegetation, was developed with multiple FS and university partners. In the last year or two, all development and testing has been accomplished by Research and R8 and the Northeast Area Forest Health staff. One goal in the selection of computer technology for this system was to provide a tool that would be usable by State and County governments as well as the FS. While the system can and has been used by these diverse clients, supporting them has required using some non-Project 615-related technology, such as the GRASS GIS, and some fairly complex programming. As a result, development staff have raised questions concerning final development and distribution of the system, support for end-users, and long-term maintenance.

METHODS: Cooperators in FHTET-FC, the Northeast Area, and Region 8 FHP will generate a list of issues and questions; FHTET-FC and cooperators will then meet generate a report which contains 1) a brief history of the project, 2) an evaluation of each pilot site addressing successes, use issues, and problems, 3) 'pros' and 'cons' of technical solutions chosen in development, 4) maintenance issues, 5) a summary of impediments to widespread distribution of the system, 6) options for the future, with resource requirements needed for each option, and 7) recommendations. Beyond one or two meetings with FHP staffs, FHTET-FC staff may interview selected end-users via telephone or site visits to ensure all important issues are captured.

PRODUCTS AND DELIVERY DATES:

GypsES Evaluation Report

July 1996

START/END DATES: FY96

COOPERATORS: Twardus, NA FHP staff; Ghent, R8 FHP staff; Thomas, Northeast Research Station staff.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Williams	1 week
Funding	\$10,500

PROJECT NO.: E6

PROJECT NAME: Decision Support Systems Coordination

LEADER: Janiga

LEADER ROLE: Cooperate and facilitate.

PROJECT OBJECTIVE: To promote and exchange information on decision analysis systems sponsored by Forest Health Protection as applicable to ecosystem management and insect and disease aspects of forest health protection and restoration.

BACKGROUND/RATIONALE: Forest Health Protection sponsors the development and support of several systems that contribute to decision analysis for forest health, ecosystem management, and insect and disease suppression. FHTET-FC will use the forums available through task forces, committees, and a variety of FS projects to promote and exchange information regarding available systems and techniques relevant to natural resource management programs.

METHODS: FHTET-FC will be responsible for creating and disseminating information on FHTET-developed systems that support decision analysis, serving as contact between interested parties and the developers. This information exchange role will be a key component of technology transfer outreach to other agency development teams and potential users of FHTET systems. Information will take the form of system status summaries, copies of relevant system information, presentations, and participation in committee discussion groups.

PRODUCTS AND DELIVERY DATES:

Participation in relevant meetings of the InterRegional Ecosystem Management Coordinating Group (about four to six sessions throughout the year)	September 1996
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START/END DATES: Ongoing

COOPERATORS: Todd Mowrer, RMS; Kendrick Greer, EMAC; Ralph Johnson, TMSC; Julie Johnson and Keith Reynolds, R6; Forrest Oliveria, R8; Jim Byler, R1; Doug Fox, TERRA/RMS; Ron Perisho, ONF.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Janiga	3 weeks
Williams	1 week
Funding	\$6,500

PROJECT NO.: F1

PROJECT NAME: GIS/Remote Sensing/Data Visualization Applications Support

LEADER: Pywell

LEADER ROLE: Conduct.

PROJECT OBJECTIVE: To provide training, support, and leadership to FHP field units and domestic and international cooperators in the evaluation, use, and application of remote sensing, image processing, data visualization, and GIS technologies through the facilities of the Advanced Technology Lab, FHTET-FC.

BACKGROUND/RATIONALE: As Project 615 is implemented over the next several years, many advanced analytical tools will be available to FHP field units. The success of this implementation will depend, to a large degree, on having field personnel experienced in the use of these tools. One of the tasks of FHTET-FC will be to work with field units in cooperative projects to evaluate advanced technology tools, determine how these tools can best be applied to FHP problems, and to train field personnel in the use and application of these tools.

METHODS: FHTET-FC will conduct and provide short-term projects, technical assistance, training sessions, and technology development projects through cooperative special-project funding.

PRODUCTS AND DELIVERY DATES:

Technology evaluation and application reports, papers,
journal articles, and other forms of communication

September 1996

START/END DATES: Ongoing

COOPERATORS: FHP field units; Bobbe, Ishikawa, Alban, Maas, and Lachowski, RSAC; Regions/Area; vendors; universities; and international cooperators.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Pywell	2 weeks
Myhre	2 weeks
Funding	\$15,000

PROJECT NO.: F2

PROJECT NAME: SmartForest Implementation (TDP)

LEADER: Pywell

LEADER ROLE: Cooperate.

PROJECT OBJECTIVE: To provide support, in cooperation with FHP Ogden Field Office and the Dixie National Forest, for the Technology Development Project: to result in the implementation of the SmartForest visualization software on the Dixie National Forest.

BACKGROUND/RATIONALE: In 1994, a Technology Development Project was funded to implement and evaluate data visualization software on the Dixie National Forest. Due to contract problems in Region 4, the work did not commence until 1995. FHTET-FC is committed to provide technical support to the Region and Forest as they implement the SmartForest software and conduct an evaluation of this technology in the Environmental Assessment (EA) process.

METHODS: FHTET-FC, in conjunction with cooperators, will install the software on the Forest's Project 615 hardware for use in the preparation of an EA for a proposed timber sale involving salvage spruce of beetle-killed timber and for a related "green sale" intended to reduce the impact of an ongoing spruce beetle outbreak.

PRODUCTS AND DELIVERY DATES:

Implementation of the software	April 1995
Evaluation Report	December 1996

START/END DATES: FY96 - FY97

COOPERATORS: Munson, FHP-Region 4; Ferguson and Hayman, Dixie National Forest; Orland, University of Illinois.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Pywell	2 weeks
Roschke	2 weeks
Funding	\$14,000

PROJECT NO.: G1

PROJECT NAME: Pest-Related Value Research Review

LEADER: Smith

LEADER ROLE: Provide oversight.

PROJECT OBJECTIVE: To identify, gather, review, and build a database of pest-related value research; to determine the needs of FHP managers for value-related information.

BACKGROUND/RATIONALE: FHP programs and projects have traditionally been analyzed and justified on the basis of timber values or tree removal and replacement costs. These approaches are incomplete in the present environment in which FS management must consider ecosystem stability or restoration, biodiversity, endangered species protection, visual quality, and other non-market goals. A significant amount of research has been done by the Forest Service and others in these areas, but results have generally only been available in academic journals or unpublished reports. In fiscal year 95, FHTET-FC began reviewing research related to pest impact and treatment and non-market values. This task will complete that work and make it available in a form useful to managers.

METHODS: FHTET-FC will finish review of pest-related values work begun in FY95, summarize research, and distribute results to FHP field offices through reports and meetings. FHTET-FC will conduct a survey of FHP field unit values information needs to serve as the basis for a technology transfer plan. FHTET-FC will contribute to ongoing FHP projects with a non-timber emphasis to develop demonstrations on how values information can be collected and used in FHP contexts.

PRODUCTS AND DELIVERY DATES:

Value concept review and database	December 1995
Pest research review	February 1996
FHP Needs assessment	June 1996
Tech Transfer Plan	September 1996

START/END DATES: FY96 - FY97

COOPERATORS: Richard Walsh and John Loomis, CSU; Tom Brown, RM; Tom Holmes, SO; Dave Bengston, NC; Joe Lewis, FHP.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Smith	4 weeks
Funding	\$2,500

PROJECT NO.: G2

PROJECT NAME: Forest Service Value Analysis

LEADER: Smith

LEADER ROLE: Provide oversight.

PROJECT OBJECTIVE: To finish ongoing reviews of Forest Service valuation and risk approaches to program and project analyses.

BACKGROUND/RATIONALE: The Forest Service has several ongoing efforts to more completely evaluate its programs and projects in terms of both market and non-market benefits, costs, and risks. The NFS National Fire Management Analysis System (NFMAS), for example, considers non-market values associated with forest protection and fire effects. FHP should examine how other parts of the agency treat values related to forest health protection, as separate offices often consider the same or similar values in their protection programs.

METHODS: A coop agreement funded in FY95 with Dr. John Loomis of CSU will, in large part, accomplish this task. Dr. Loomis is currently involved with non-market value studies to be used in improving NFMAS. FHTET-FC is working closely with FS research staff involved with NFMAS in an effort to find common solutions for valuation of forest protection.

PRODUCTS AND DELIVERY DATES:

Report on current FS valuation and risk analyses	February 1996
Report on FHP value usage	July 1996
Report on management use of forest health value information	December 1996

START/END DATES: FY96 - FY97

COOPERATORS: John Loomis and Michele Haefele, CSU; Armando Gonzalez-Caban, R6; Dave Cleaves, SO; George Peterson and Bev Driver, RMS.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Smith	4 weeks
Funding	\$3,000

PROJECT NO.: H1

PROJECT NAME: FHTET Communications Support

LEADER: Janiga

LEADER ROLE: Conduct.

PROJECT OBJECTIVE: To provide support to external communications for the Forest Health Technology Enterprise Team.

BACKGROUND/RATIONALE: FHTET requires support for production of quarterly newsletters, a communications plan, and publications guidelines. The entire team cannot efficiently participate in all aspects of the deliberations and operations; therefore, a team of representatives of the three sites and subject matter specialists will be formed to satisfy these needs.

METHODS: The communications team will develop a complete project plan that incorporates three unique subprojects for each of the three primary tasks to be supported. The entire team will meet at least three times during the year to conduct work, and will use telephone conference calls as needed to resolve issues with as much group interaction as possible. Individuals will manage subprojects and serve as primary contact points for external communication on project direction, methods, and services needed to fulfill objectives. The team will periodically present intermediate and final products for full review by the entire FHTET participants.

PRODUCTS AND DELIVERY DATES:

General operating plan of action	August 1995
Newsletters	October, January, April, and July
Communications Plan (5-10 pages)	November 1995
Publications Guidelines (1-5 pages)	November 1995

START/END DATES: FY96

COOPERATORS: Linda Feldman, PAO-WO.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Janiga	5 weeks
Roschke	3 weeks
Funding	\$42,000
	(\$21,000 covered by FHTET-D and FHTET-M)

PROJECT NO.: H2

PROJECT NAME: Education/Training Certification Program Development

LEADER: Myhre

LEADER ROLE: Cooperate.

PROJECT OBJECTIVE: To evaluate options and develop procedures, in cooperation with the RSAC, the Geometronics Service Center (GSC), and the University of Arizona, for establishing an education accreditation/certification program for in-house training activities. This program would initially deal with remote sensing and related technologies training.

BACKGROUND/RATIONALE: Through a variety of FS efforts, a significant amount of awareness and training is being provided; however, it is difficult to assess the adequacy and efficacy of these efforts. The topic of an in-house certification program has been discussed at several FS/Remote Sensing Conferences (Tucson, Arizona, 1990 and Orlando, Florida, 1992) and among some of the FS training cadre for a number of years. This task is an effort to address the ongoing issue and move it toward implementation.

This Certification concept would serve a variety of purposes: 1) trainees would be required to show satisfactory completion of a course through a final exam process, 2) employees would receive course credit, 3) levels of expertise could be established for work-specific job classifications (e.g., remote sensing specialist, aerial survey specialist, etc.), 4) a mechanism is provided for supervisors to better evaluate employees by skill levels within expertise areas, and 5) credit could be accumulated toward some future education goal by the employee.

METHODS: Conduct a series of meetings with RSAC and GSC training staffs and the University of Arizona administration and faculty to: 1) develop a draft proposal for a certification program, 2) discuss standard formats for training manuals, trainer standards, and operation procedures, and 3) develop a training course examination/testing process through the University of Arizona.

Conduct several training courses during FY96 using procedures established with the University to evaluate and prove the concept.

PRODUCTS AND DELIVERY DATES:

Draft outline/proposal for a program	January 1996
Several training courses completed	June 1996
Accomplishment report	September 1996

START/END DATES: Ongoing

COOPERATORS: RSAC; GSC; University of Arizona administration and faculty.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Myhre	6 weeks
Funding	\$3,000

PROJECT NO.: H3

PROJECT NAME: World Wide Web Server Development

LEADER: Roschke

LEADER ROLE: Conduct and provide oversight.

PROJECT OBJECTIVE: To provide platforms for internal development of, and external access to, Internet services; provide support and infrastructure for preparing and converting FHTET products, services, and information into Internet-ready products, services, and information, and make this information available on the Internet.

BACKGROUND/RATIONALE: The Internet is a large and growing community of electronically linked individuals and organizations. The World Wide Web (WWW) is a globally-accessible hypertext information system. Each year, millions of additional people gain access to the Internet, and use it to fulfill many of their information needs. The Administration has directed that all Federal agencies make information available to the public via the Internet.

METHODS: Secure an interim connection to the Internet that can be used until a connection is available through the Forest Service corporate Wide-Area Network. Develop an internal WWW server that can be used for development. Provide access to the internal server at the desktop for key individuals. Provide a central access point to the Internet and WWW for FHTET-FC. Develop external WWW information services to make FHTET and other Forest Health-related products, services, and information globally available through the Internet. Use the University of Illinois as a consultant for development, configuration, and implementation of information services and access tools, and for providing other WWW-related expertise.

PRODUCTS AND DELIVERY DATES:

Internet connection	October 1995
Internal server	February 1996
Internet server	September 1996
Information services	September 1996

START/END DATES: Ongoing

COOPERATORS: University of Illinois.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Roschke	12 weeks
Scrivner	4 weeks
Funding	\$54,000 (\$27,000 covered by FHTET-D and FHTET-M)

PROJECT NO.: H4

PROJECT NAME: World Wide Web Workshop

LEADER: Roschke

LEADER ROLE: Conduct.

PROJECT OBJECTIVE: To hold a workshop to introduce Internet and WWW services to FHP personnel from Regions, Stations, the Northeast Area, and the Washington Office in order to 1) increase familiarity with Web services throughout FHP, and 2) discuss information services that FHP could or should provide.

BACKGROUND/RATIONALE: Forest Service employees generally have only very limited access to the Internet and the World Wide Web. The best way to understand and appreciate the power, usefulness, and ease-of-use of WWW information services is to use them. This workshop will provide FHP personnel with an opportunity to see and get hands-on experience using Internet and WWW information services.

METHODS: Rent or otherwise secure Internet-ready PCs to be connected to the Internet in the Craddock Building conference rooms through FHTET-FC's Internet connection.

PRODUCTS AND DELIVERY DATES:

Workshop

March 1996

START/END DATES: FY96

COOPERATORS: University of Illinois (through the coop agreement identified in H-3).

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Roschke	4 weeks
Funding	\$22,470

PROJECT NO.: H5

PROJECT NAME: FHTET Presentation Graphics

LEADER: Scrivner

LEADER ROLE: Conduct.

PROJECT OBJECTIVE: To maintain and update the Forest Health Technology Enterprise Team presentation graphics packages; to provide technical assistance in modifying and improving communication materials for presentation by FS personnel (FHTET, Regions, Area, and WO).

BACKGROUND/RATIONALE: The FHTET overview graphics package will be created and maintained to present a current overview of the Forest Health Technology Enterprise Team's expertise and technology. This package will be used in briefings to illustrate the strategy for making appropriate technology available to meet emerging forest health challenges. It will be distributed as needed for presentation.

PRODUCTS AND DELIVERY DATES:

Presentation graphics

September 1996

START/END DATES: Ongoing

COOPERATORS: FHTET-Davis and FHTET-Morgantown.

RESOURCE REQUIREMENTS (FHTET-Fort Collins):

Scrivner	10 weeks
Adams	1 week
Janiga	1 week
Myhre	1 week
Pywell	1 week
Roschke	1 week
Smith	1 week
Williams	1 week
Funding	\$7,000

PROJECT NO.: I1

PROJECT NAME: Vegetation Management Options for Enhancing Ecosystem Health

LEADER: Barry

LEADER ROLE: Cooperate.

PROJECT OBJECTIVE: To demonstrate and evaluate herbicide ground treatment methods for use in supporting species diversity, ecosystem management, and forest health in a middle-aged Douglas-fir forest.

BACKGROUND/RATIONALE: This project is part of a larger ecosystem effort funded by National Biological Survey and managed by Oregon State University. As an alternative to aerial application, FHTET-D is evaluating hand-held spray systems. The project has four objectives, the first of which is the dominant feature of the study. Vegetation manipulation under existing forest stands is rendered difficult by interception of herbicide droplets by the canopy; use of granular, soil-active herbicides, such as high rates of imazapyr, would jeopardize overstory residual trees. Thus, we are emphasizing development of low-level application technology that will permit broadcast treatments with hand-held equipment at low volumes necessary for logistical feasibility. Low-volume application technology needs to be calibrated and combine with practical swath widths, using small droplet size for economy and biological effectiveness.

METHODS: The majority of funding for this task is being provided by NBS. Calibration trials were held at Davis, California, July 1995; this was followed immediately by field application on eighteen 1.8-acre plots in Oregon. Vegetation composition and cover analyses will be made on these plots in 1996. OSU and FHP will jointly evaluate the patterns of vegetation change from pretreatment levels based on 720 understory sample points, and determine whether the application technology has met the vegetation management objectives satisfactorily.

PRODUCTS AND DELIVERY DATES:

Procedures and recommendations for safe, low-cost, and efficacious ground application of herbicides in Pacific Northwest forests. Methods will be submitted for scientific journal publications jointly by OSU and FHTET-Davis. Delivery date: December 1996

START/END DATES: FY95 - FY97

COOPERATORS: Mike Newton, Oregon State University; Roy Magelssen, R-6; FHM.

RESOURCE REQUIREMENTS (FHTET-Davis):

Barry	1 week
Skyler	1 week
Funding	\$20,000

PROJECT NO.: I2

PROJECT NAME: Time of Day Study/Temperature Effects

LEADER: Barry

LEADER ROLE: Cooperate and provide oversight.

PROJECT OBJECTIVE: To investigate the influence of vertical temperature difference (stability) on the canopy penetration, drift, and fate of aerial sprays applied over orchards and forests; to conduct such tests in both deciduous and coniferous canopies with partners from University of California, Davis Campus (UCD), the State of California, U.S. Forest Service, and private industry.

BACKGROUND/RATIONALE: Differences in vertical temperatures from the surface up to the base of the mixing layer are well known to affect the deposition and drift of pesticides. Sprays typically mix vertically to the inversion cap (nighttime) or mixing layer (daytime). As the stability changes with increased surface heating, there can be major changes in the location of spray deposits and in their concentrations. Data are needed to quantify this phenomena and to enhance the near-field predictive capability of FSCBG (Forest Service-Cramer-Barry-Grim: an aerial application simulation model).

METHODS: In cooperation with UCD, private orchard operators, and industry, FHTET-D plans to conduct a series of low-cost, ultra-low volume spray trials using fixed-wing aircraft applications with logistical support from industry and the University of California.

PRODUCTS AND DELIVERY DATES:

Enhancement of FSCBG near-field predictions;
Update to FSCBG user manual;
Drift reduction recommendations;
Increased sensitivity to time of day and temperature in
conducting spray operations;
Scientific journal publications

Delivery date: fiscal year 1997

START/END DATES: FY96 - FY97

COOPERATORS: Bill Steinke, Norm Akesson, and Frank Zalom, UCD; Milt Teske, CDI; Harry Hubbard, NE Station; Harold Thistle, MTDC; Bill May, FRI; Gary Kirfman, Abbott Labs.

RESOURCE REQUIREMENTS (FHTET-Davis):

Barry	5 weeks
Skyler	4 weeks
Funding	\$35,000

PROJECT NO.: I3

PROJECT NAME: Field Meteorology Handbook

LEADER: Barry

LEADER ROLE: Cooperate and provide oversight.

PROJECT OBJECTIVE: To prepare and publish a book on forest meteorology for use in planning and conducting meteorologically sensitive forestry operations.

BACKGROUND/RATIONALE: There is need for a meteorology reference handbook to be used as a training and field reference document for those who conduct meteorologically sensitive forestry operations (including aerial spraying and prescribed burning) for the purpose of managing spray and smoke drift. Mountain and urban weather is driven by highly complex atmospheric processes that have not been described and illustrated in a scientific yet easy-to-understand reference manual. The field manager must have the knowledge to make important and sometimes critical decisions based upon his/her knowledge in meteorology. This project will produce a well-illustrated handbook using state-of-the-art graphics and produced by a highly respected and knowledgeable forest meteorologist.

METHODS: The work will be prepared primarily by Dave Whiteman, Battelle NW, via an interagency agreement. An editorial board made up of scientists from National Weather Service (NWS), the U.S. Army, and the USDA Forest Service will be established to contribute and provide critical review.

PRODUCTS AND DELIVERY DATES:

FS publication for wide distribution

January 1997

START/END DATES: FY96 - FY97

COOPERATORS: Harold Thistle, MTDC; Dave Whiteman, Battelle; Bruce Grim, U.S. Army; Rusty Billingsly, Carl Gorki, and Andy Edman, NWS.

RESOURCE REQUIREMENTS (FHTET-Davis):

Barry	3 weeks
Funding	\$25,000

PROJECT NO.: I4

PROJECT NAME: Hardwood Canopy Description in FSCBG Model

LEADER: Barry

LEADER ROLE: Provide oversight.

PROJECT OBJECTIVE: To provide FSCBG model with capability to predict insecticide spray coverage in various types of eastern hardwood canopies subject to gypsy moth attack.

BACKGROUND/RATIONALE: The FSCBG model's canopy module was developed using coniferous forest descriptions. An extensive database now describes eastern deciduous forests (thanks to Jeff Witcosky and TDP funding), and this database is to be installed into FSCBG. The model will then be capable of predicting canopy deposition into deciduous canopies as a function of the canopy type, size, biomass, meteorology, and various spray application parameters. It will also be possible to predict level of efficacy and probability of achieving desired levels of control.

METHODS: Continuum Dynamics, Inc. (CDI), will install this data set into FSCBG model and evaluate the product subject to availability of contract funds.

PRODUCTS AND DELIVERY DATES:

Updated version of FSCBG with user documentation

December 1995

START/END DATES: FY96

COOPERATORS: Jeff Witcosky, R-8; Milt Teske, CDI; Dave Miller, University of Connecticut.

RESOURCE REQUIREMENTS (FHTET-Davis):

Barry	1 week
Funding	\$10,000

PROJECT NO.: 15

PROJECT NAME: SpraySafe Manager - FSCBG Aerial Application Decision Support System

LEADER: Barry

LEADER ROLE: Coordinate, cooperate, and provide oversight.

PROJECT OBJECTIVE: To provide land managers with extended FSCBG aerial spray model capability with an easy-to-use decision support system to support safe, efficacious, and economical application of pesticides.

BACKGROUND/RATIONALE: FSCBG, a validated aerial application simulation model, provides applicators and regulators with a reliable method to calculate exposure, to predict drift, and to mitigate adverse effects. However, the model lacks biological dose-response prediction capability, and many non-technical users also find the model difficult to use and interpret. To increase the practical value of FSCBG predictions, a method for interpreting exposure data in a biologically meaningful way will be included in this project. SpraySafe Manager will be composed of seven modules: environmental, efficacy, productivity, calibration, training, database access, and aerial applicator advisor.

METHODS: SpraySafe Manager originated when New Zealand's Forest Research Institute (FRI), FHTET-Davis, Environment Canada, MTDC, NA, CDI, and others compiled and merged their related needs during concept development. Development work will now be done primarily by FRI and Continuum Dynamics (CDI), with costs shared among FRI, NZ forest and pesticide industries, and FS. A development plan and specifications have been developed.

PRODUCTS AND DELIVERY DATES:

SpraySafe Handbook: A comprehensive but practical aerial application reference manual, of value to operational managers.

SpraySafe Guide: A concise educational document, written for people at the field operational level.

SpraySafe Manager: A highly user-friendly, PC-based, aerial application decision support system. It will integrate predictions from a powerful aerial application simulation model with predictors for buffer zones and of biological effect so that environmental consequences of application strategies can be quantified and used to develop application strategies.

Delivery date (first phase): FY97

START/END DATES: FY96 - FY97

COOPERATORS: Brian Richardson, FRI, with the New Zealand forestry and pesticide industry; Dan Twardus, NA Morgantown; Harold Thistle, MTDC; Milt Teske, CDI; Bob Mickle, Environment Canada; John Ghent, R-8.

RESOURCE REQUIREMENTS (FHTET-Davis):

Barry	4 weeks
Skyler	2 weeks
Funding	\$35,000

PROJECT NO.: J1

PROJECT NAME: Dispersion and Fate of *Bacillus thuringiensis* (*Bt*) in Forested Canyons

LEADER: Barry

LEADER ROLE: Cooperate.

PROJECT OBJECTIVE: To evaluate the dispersion and fate of *Bt* in forested mountain terrain; to evaluate FSCBG model in predicting *Bt* drift; to measure *Bt* drift and canopy deposition; and to monitor fate of *Bt* in the forest soil.

BACKGROUND/RATIONALE: The 1991-1993 phase of the Utah gypsy moth eradication project provided the opportunity to obtain information on the dispersion and fate of aerially applied *Bt*. In cooperation with R-4, the State of Utah, the U.S. Army, and other cooperators, FHTET-Davis staff demonstrated that *Bt* drifts in detectable amounts at least 5 miles from the downwind edge of treatment areas in forested, mountain terrain; at the same time, FHTET-Davis staff also learned about *Bt* deposition in canopies and persistence in soil. Data from the 1993 treatment and the 1995 soil study sequence are currently being analyzed. At the conclusion of these and other analyses, we will be able to address EIS data gaps and will have expanded our ability to understand and predict the fate of *Bt* in complex forested mountain terrain.

METHODS: Field studies have been completed and data have been reported and published. Additional data on fate and impact are currently being analyzed by cooperators.

PRODUCTS AND DELIVERY DATES:

FHP reports Presentation at professional meetings of the Society of Environmental Toxicology and Chemistry (SETAC) Source material for environmental documents.

Delivery date: November 1996

START/END DATES: FY95 - FY97

COOPERATORS: Mark Quilter, Utah Department of Agriculture; John Anhold, R-4; Bob Smith, Abbott Laboratory; Milt Teske, CDI; Harold Thistle, MTDC; Bruce Grim, U.S. Army.

RESOURCE REQUIREMENTS (FHTET-Davis):

Barry	4 weeks
Funding	\$10,000

PROJECT NO.: K1

PROJECT NAME: Population Dynamics - Hemlock Woolly Adelgid

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: To initiate population dynamics and life history analyses of hemlock woolly adelgid (HWA) populations on eastern hemlock.

BACKGROUND/RATIONALE: HWA is a severe pest of hemlock in the eastern U.S. There is minimal data available concerning its biology, life history, and natural enemies: these data are essential to develop a management plan for HWA.

METHODS: Establish plots with HWA and monitor populations. This work will be undertaken through a cooperative agreement with Virginia Polytechnic Institute and State University.

PRODUCTS AND DELIVERY DATES:

Data concerning biology, life history and population dynamics of HWA will be summarized and integrated into efforts to develop an IPM program. Delivery date: December 1996.

START/END DATES: October 1993 - December 1996

COOPERATORS: Scott Salom and David Grey, VPI&SU; Brad Onken and Dennis Souto, USDA Forest Service-FHP; Keith Watson, Shenandoah National Park; Rusty Rhea, USDA Forest Service-FH; Michael Montgomery, NE Forest Experiment Station.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$35,000

PROJECT NO.: K2

PROJECT NAME: Inventory of Semiochemicals for Forest and Shade Tree Insects in North America.

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: 1) To develop an inventory of semiochemicals of forest and shade tree insects in North America; 2) to assess the status of each semiochemical in regard to uses in forest pest management; and 3) to produce a publication which lists and describes uses for these semiochemicals and suggests priorities for their development.

BACKGROUND/RATIONALE: Over the past 20 years, there has been a great deal of effort put forth in the research, development, and application of semiochemicals for monitoring and managing forest and shade tree insects. There is currently no centralized system for maintaining information on the identity and/or use of forest insect semiochemicals. Due to the large number of organizations and agencies involved in the research, development and application of semiochemicals both in North America and internationally, there is a need to develop an inventory of the status of these semiochemicals. These data will provide the basis for prioritization of future efforts in the use of semiochemicals to manage forest and shade tree insects.

METHODS: An initial list of forest insect semiochemicals is being compiled by searching the literature via computerized databases available through the University of Georgia libraries and through the USDA Forest Service facilities in SOUTHFORNET.

Forest insects will be grouped into broad categories based on feeding groups (such as bark beetles and defoliators), and resource groups (e.g., seed and cone insects and reproduction insects). Specific insects and their associated semiochemicals will be listed within these broad categories.

The known or suspected biological function and development status of each semiochemical, particularly those with demonstrated or potential use for management, will be described.

PRODUCTS AND DELIVERY DATES:

Electronic database and report summarizing status of semiochemicals with updates scheduled every five years. The database will be made available on the Forest Service communication network as well as the Internet.

Delivery date: December 1996.

START/END DATES: October 1994 - December 1996

COOPERATORS: Wayne Berisford, University of Georgia.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	-0-

PROJECT NO.: K3

PROJECT NAME: Inventory of Microbials and Nematodes for Control of Forest and Shade Tree Insects in North America

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: To develop an inventory on the potential for the use of microbials and nematodes to manage the major forest and shade tree insect pests in North America.

BACKGROUND/RATIONALE: There has been a great deal of effort among numerous scientists and practitioners in the research, development, and application of microbials and nematodes for managing forest and shade tree insects in North America. Unfortunately, these efforts have not been reviewed and summarized concerning the criteria for success or failure and the applicability of selected microbials and nematodes for managing additional pest species. This task fulfills that need.

METHODS: 1) Interviews with subject matter specialists (e.g., microbiologists, nematologists) to determine which microbials (e.g., viruses, bacteria, fungi, protozoa) and nematodes are most important (or show the most potential) in managing forest and shade tree pests, and to define certain key characteristics (including limitations for use); 2) compilation of the scientific literature on microbial control of the principal forest insects in North America; 3) use of a ranking system to quantify each species' microbial control potential; 4) preparation and review of a draft report; 5) distribution of a final report and establishment of an electronic database; and 6) initiation of priority project(s). This work will be undertaken through a cooperative agreement with Louisiana State University.

PRODUCTS AND DELIVERY DATES:

Electronic database and report summarizing status of microbials and nematodes for managing forest and shade tree pests, with updates scheduled every five years. The database will be made available on the Forest Service communication network and the Internet.

Delivery date: December 1996.

START/END DATES: October 1994 - December 1996

COOPERATORS: James Fuxa, Louisiana State University.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$10,000

PROJECT NO.: K4

PROJECT NAME: QA/QC Standards for Semiochemicals

LEADER: Reardon

LEADER ROLE: Coordinate, facilitate, and provide oversight.

PROJECT OBJECTIVE: To develop and implement a series of QA/QC standards for semiochemicals used in monitoring and managing forest and shade tree insects.

BACKGROUND/RATIONALE: At the present time, there are no established standard QA/QC guidelines for the manufacture of semiochemical used in monitoring and managing forest and shade tree insects. Commercially manufactured products are only evaluated for uniformity of release rates by the manufacturer (with each manufacturer using "in-house" techniques), and even these data are not readily available to product users.

METHODS: 1) Consult with scientists and commercial manufacturers of semiochemical products to summarize current QA/QC protocols; 2) convene a panel of representatives from above group to develop draft standard QA/QC guidelines; 3) prepare final QA/QC guidelines; and 4) analyze selected currently registered semiochemical products using the newly developed QA/QC guidelines.

PRODUCTS AND DELIVERY DATES:

A uniform set of QA/QC guidelines for semiochemicals December 1996.

START/END DATES: October 1994 - December 1996

COOPERATORS: The Agricultural Research Service has expressed interest in providing this service; therefore, contact with potential private contractors has not been initiated.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$40,000

PROJECT NO.: K5

PROJECT NAME: Biological Control Survey of Noxious Weeds in Forest Ecosystems

LEADER: Reardon

LEADER ROLE: Coordinate, facilitate, and provide oversight.

PROJECT OBJECTIVE: To compile information on the current use of biological controls to manage noxious weeds in forest ecosystems.

BACKGROUND/RATIONALE: There has been a great deal of research among numerous scientists world-wide concerning the use of natural enemies to control noxious weeds. Unfortunately, these efforts have not been reviewed and summarized concerning the criteria for success or failure for individual pest species and applicability for noxious species found in forest ecosystems in North America. This survey is intended to address that lack.

METHODS: 1) Interview subject matter specialists to determine which noxious weeds have the greatest impact on forest ecosystems, and the success of efforts to manage those weeds; 2) compile the available scientific literature; and 3) publish a report on the current status of research, including recommendations for research, development, and application of natural enemies for managing noxious weeds.

PRODUCTS AND DELIVERY DATES:

Electronic database and report summarizing the status of biological control efforts for noxious weeds in forest ecosystems, with updates scheduled for every five years. The database will be made available on the Forest Service communication network and the Internet.

Delivery date: December 1996.

START/END DATES: October 1994 - December 1996

COOPERATORS: Norm Reeves and Lloyd Knutson, USDA-ARS; James Olivarez, USDA Forest Service: R-1 Range Implementation.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$10,000

PROJECT NO.: K6

PROJECT NAME: IPM Program for *Tomicus piniperda* (Common Pine Shoot Beetle)

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: To coordinate the development of an operational integrated pest management (IPM) program for *Tomicus piniperda*.

BACKGROUND/RATIONALE: The common pine shoot beetle (*Tomicus piniperda*) has become established in the US and Canada in the general area bordering several of the Great Lakes, and poses a severe threat to numerous conifer species. This pest has not been recovered in the South or West, but preliminary evaluations suggest the beetle can attack several southern coniferous species. A quarantine has been established by APHIS for shipping specific articles from the Lake States, but available treatments are limited for these regulated articles. An IPM program is needed to manage this pest. Biological control offers the potential for a long-term management strategy, as well as an essential component of an IPM program.

METHODS: Schedule a meeting with representatives from research and action agencies currently involved in managing this pest. Prepare a summary of what is known about this pest species, including opportunistic natural enemies recovered and desired characteristics of these natural enemies. Prepare a plan for the development of an overall IPM program, including the development of pest management zones for the common pine shoot beetle. This work will be undertaken through cooperative agreements with Michigan State University and Purdue University.

PRODUCTS AND DELIVERY DATES:

Operational IPM program for the common pine shoot beetle. December 1997.

START/END DATES: October 1994 - December 1997

COOPERATORS: Vic Mastro and Tom Burger, USDA-APHIS-PPQ; Robert Haack, NC Forest Experiment Station; Canadian Forest Service, Forest Pest Management Institute; Clifford Sadof, Purdue University; Debbie McCollough, Michigan State University.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	2 weeks
Funding	\$43,000

PROJECT NO.: K7

PROJECT NAME: Biological Control of *Cylindrocladium* Root Disease

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: To determine the species (strain) of ectomycorrhizal (ECM) fungus(i) and its combination with other treatments for suppression of *Cylindrocladium* root disease and for promoting seedling growth.

BACKGROUND/RATIONALE: *Cylindrocladium* root disease has caused severe losses of both conifer and hardwood seedlings in forest tree nurseries, and is a significant problem in seedbeds and in transplant stock. This disease is reported in 20 eastern and central states, in the state of Washington, and in the provinces of Quebec and Ontario, Canada. Control of these pathogens have been mostly dependent upon soil fumigation.

METHODS: Pre-treatment and post-treatment soil and disease sample collections will be taken from a Pennsylvania nursery that has natural infections of *Cylindrocladium* spp. Disease incidence and pathogen population will be estimated quantitatively. Ectomycorrhizal fungi screening and compatibility testing with the other control agents will be conducted in the laboratory. Techniques of ectomycorrhizal inoculation and root disease control tests will be conducted in a greenhouse or growth chamber with all combinations of treatments. Field tests will be conducted in the nursery. The selected ECM fungus(i) will be used to control *Cylindrocladium* root disease with or without the combination of other control agents, including other microorganisms, a cover crop, and soil additive. This work will be undertaken through a cooperative agreement with Michigan Technological University.

PRODUCTS AND DELIVERY DATES:

Operational IPM program for *Cylindrocladium* root disease. March 1998

START/END DATES: October 1994 - March 1998

COOPERATORS: Yun Wu, USDA Forest Service - National Center for FHM; Martin MacKenzie, USDA Forest Service - FHP; Margaret Gale, Michigan Technological University.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$10,000

PROJECT NO.: K8

PROJECT NAME: Biological Control of Mile-a-Minute Weed

LEADER: Reardon

LEADER ROLE: Cooperate, coordinate, and facilitate.

PROJECT OBJECTIVE: To coordinate the development of an operational biological control program for Mile-a-Minute Weed.

BACKGROUND/RATIONALE: Mile-a-Minute Weed is an expanding noxious weed in the eastern U.S. Currently, only chemical controls are available, and cannot be used in numerous habitats (e.g., riparian).

METHODS: Review the literature to obtain baseline data on natural enemies of Mile-a-Minute Weed in Asia. Arrange to collect natural enemies, rear these natural enemies in quarantine; if appropriate, release and evaluate these natural enemies.

PRODUCTS AND DELIVERY DATES:

Operational biological control program for Mile-a-Minute Weed. FY 1998.

START/END DATES: October 1995 - December 1998

COOPERATORS: Bill Day, USDA-ARS; Gary Johnston and Dave Reynolds, USDI-NPS; Bill Buckart, USDA-ARS; Barry Towers, Pa. Bureau of Forestry; Scott Kurtzman, Gladfelter Paper Co.; Ernest Delfosse, USDA-APHIS; Ding Jianqing, Chinese Academy of Agricultural Sciences, Institute of Biocontrol, Beijing, Peoples Republic of China.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	5 weeks
Funding	\$40,000

PROJECT NO.: K9

PROJECT NAME: 4-AA For Southern Pine Beetle

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: To develop an operational technique to protect individual trees used as nesting sites by red-cockaded woodpecker (RCW) from southern pine beetle (SPB) attacks.

BACKGROUND/RATIONALE: RCW is an endangered species whose nesting sites are threatened by SPB. 4-AA is a novel host compound that has been developed specifically to repel SPB and associated bark beetles from individual trees.

METHODS: RCW clans will be identified and treatment plots established. RCW clans will receive one of three treatments: all cavity trees treated with a novel host compound (4-AA); 50 percent of the cavity trees treated with 4-AA; or no treatment (the control group). Nesting sites will be continuously monitored for bark beetle activity.

PRODUCTS AND DELIVERY DATES:

A cost-effective and environmentally compatible technique to protect high-value, small stands or single trees from SPB and associated bark beetle attacks. Delivery date: April 1997.

START/END DATES: October 1993 - April 1997

COOPERATORS: Jane Hayes and Brian Strom, Southern Forest Experiment Station; Bobbe Fitzgibbon, R8 FHP; Dave Chabreck and Dianne Hancock, Homochitto National Forest; Jim Burton and Earl Stewart, Kisatchie National Forest.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$35,000 (Interregional Transfer of Funds to Southern Forest Experiment Station)

PROJECT NO.: K10

PROJECT NAME: Register Douglas-fir Tussock Moth Pheromone

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: To obtain registration of the Douglas-fir tussock moth (DFTM) pheromone for use in managing low-density populations.

BACKGROUND/RATIONALE: Environmentally specific tactics are not available to suppress low-density building populations of DFTM. The nucleopolyhedrosis virus product TM-Biocontrol-1 is registered by the U.S. Environmental Protection Agency (USEPA) for control of DFTM populations, although it is only efficacious against moderate-density to high-density populations.

METHODS: Acquire efficacy, environmental fate, and non-target impact data through literature searches and consultation with DFTM researchers in the US and Canada. Organize these data, identify data gaps, and prepare a draft report for review. Fill data gaps and prepare registration package for submission to USEPA.

PRODUCTS AND DELIVERY DATES:

Operational specific tactic for managing low-density building DFTM populations.

Delivery date: December 1997.

START/END DATES: October 1994 - December 1997

COOPERATORS: David Thomas, USDA Forest Service-FHP.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	4 weeks
Funding	\$50,000

PROJECT NO.: K11

PROJECT NAME: Optimize NPV Products Registered by US Forest Service

LEADER: Reardon

LEADER ROLE: Cooperate, coordinate, and facilitate.

PROJECT OBJECTIVE: To improve application technology of nucleopolyhedrosis viruses (NPVs: e.g., Gypchek, TM-BioControl-1, and Neochek-S).

BACKGROUND/RATIONALE: Application technology currently used for biopesticides was originally developed for chemical insecticides, and there is an urgent need to apply this technology to biopesticides such that efficacy and deposition are maximized.

METHODS: Modify application equipment and develop formulations and strains for evaluation in laboratory, spray tower, and field tests.

PRODUCTS AND DELIVERY DATES:

An operationally effective dose, rate, formulation, and
application equipment for each NPV.

December 1998.

START/END DATES: October 1995 - December 1998

COOPERATORS: John Podgwaite, USDA Forest Service; John Cunningham, Forestry Canada;
Kevin Thorpe, USDA ARS.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	3 weeks
Funding	\$40,000
	(\$30,000 from FY95 funds)

PROJECT NO.: K12

PROJECT NAME: Biological Control of Cypress Aphid in Kenya

LEADER: Reardon

LEADER ROLE: Coordinate.

PROJECT OBJECTIVE: 1) To locate, collect, and rear parasites and invertebrate predators of the cypress aphid from populations in North America, Mexico, India and Pakistan; and 2) to ship these parasites and invertebrate predators to a quarantine facility in England for eventual release in Kenya.

BACKGROUND/RATIONALE: The cypress aphid is a major pest of cypress in Kenya. Biological control is the preferred control strategy.

METHODS: Survey for parasites and predators in the native habitats of the cypress aphid. Collect and ship the parasites and predators to a quarantine facility for rearing and taxonomic identification.

PRODUCTS AND DELIVERY DATES:

Establish a natural enemy complex for cypress aphid in Kenya in order to minimize damage caused by this pest species. Delivery date: December 1996.

START/END DATES: October 1993 - December 1996

COOPERATORS: Daniel Kucera, USDA Forest Service-FHP; Joseph Mwangi, Kenya FHMC; Sean Murphy, International Institute of Biological Control; Robert Averill and Susan Johnson, USDA Forest Service-FHM.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$10,000 (from International Forestry, Northeast Area)

PROJECT NO.: K13

PROJECT NAME: Cooperative Biological Control Efforts - ARS, APHIS, IIBC

LEADER: Reardon

LEADER ROLE: Coordinate.

PROJECT OBJECTIVE: To expedite the development and use of biological control agents to manage forest and urban pests.

BACKGROUND/RATIONALE: Recent emphasis on the implementation of biological controls and reduced budgets has increased the need for cooperative efforts. The Agricultural Research Service (ARS), Animal and Plant Health Inspection Service (APHIS), and the International Institute of Biological Control (IIBC) are all interested in the development of biological controls, and are therefore logical cooperators.

METHODS: Representatives from each agency meet once a year and mutually fund one project. Studies were conducted in the laboratory to determine alternate host requirements of the tachinid gypsy moth parasite, *Blepharipa scheneri*.

PRODUCTS AND DELIVERY DATES:

Expedite the implementation of biological controls for managing pest species. Ongoing.

START/END DATES: Ongoing.

COOPERATORS: Roger Fuester and Paul Schaefer, USDA-ARS; Ernest Delfosse, USDA-APHIS; Sean Murphy, IIBC.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$5,000

PROJECT NO.: K14

PROJECT NAME: Biological Control of mealybug, *Oracella acuta*, in the Peoples Republic of China

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: 1) To establish and/or identify dense populations of *Oracella acuta* in pine plantations in Georgia in order to collect natural enemies; 2) to identify the major parasitoids and predators that may be used in a classical biological control program in the Peoples Republic of China (PRC); and 3) to arrange to collect and ship natural enemies to the PRC for establishment in quarantine and eventual release into the field.

BACKGROUND/RATIONALE: The mealybug *Oracella acuta* was introduced into PRC from the U.S. This mealybug is infesting millions of acres and causing severe tree mortality. This project is a top priority for PRC. All subsequent cooperative biological control efforts for other pest species depends on the success of this project.

METHODS: In 1996, efforts will be continued to collect and determine the biologies/life histories of parasites of this mealybug in the U.S., and continue to rear such parasites in greenhouses and ship them to the PRC. Parasites received in PRC will be quarantined, released, and evaluated for establishment and efficacy in the field.

PRODUCTS AND DELIVERY DATES:

Establish natural enemies of the mealybug in PRC, resulting in a large reduction in the economic impact of the mealybug damage caused by this pest species. Delivery date: December 1996.

START/END DATES: October 1994 - December 1996

COOPERATORS: Wayne Berisford, University of Georgia; Gary DeBarr, USDA Forest Service-Southeast Forest Experiment Station; Stephen Clarke, USDA Forest Service-FH; Pan Wu Yao, PRC Forestry Department-Forest Pest & Disease Control; Wu Jian, Chinese Academy of Forestry, Research Institute of Forest Protection.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$50,000 (from FAO, Northeast Area)

PROJECT NO.: K15

PROJECT NAME: Biological Control of Woodwasp in South America

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: 1) Coordinate the development of a biological control program for *Sirex noctilio* including the establishment of a natural enemy complex for minimizing damage caused by this pest species; and 2) provide training to Forest Service personnel in biological control and monitoring techniques for *S. noctilio*.

BACKGROUND/RATIONALE: The woodwasp *Sirex noctilio* is spreading rapidly in South America. An effective IPM program was developed for this pest in Australia and New Zealand.

METHODS: Collect parasites of *Sirex noctilio* from New Zealand and Australia. Ship parasites to quarantine facility in Brazil for rearing and release.

PRODUCTS AND DELIVERY DATES:

1) Training for forest scientists in biological control and pest monitoring; and 2) importation and release of natural enemies to suppress populations of *Sirex noctilio*.

Delivery date: December 1997.

START/END DATES: October 1994 - December 1997

COOPERATORS: Sean Murphy, International Institute of Biological Control; Gary Wetterberg, USDA Forest Service-IF; Edson Tadeu Iede, CNP Florestas/EMBRAPA.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$5,000
	\$100,000 (from the Consortium of South American Countries)

PROJECT NO.: K16

PROJECT NAME: Biological Control of Hemlock Woolly Adelgid

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: 1) To develop methods for rearing predators of hemlock woolly adelgid (HWA) for eventual release; 2) to design standard protocols to sample HWA and predator populations; 3) to release, to determine the effectiveness of, and to establish natural enemies of HWA, and 4) to develop an effective biological control program for HWA.

BACKGROUND/RATIONALE: The HWA is becoming a serious pest of hemlock in the eastern US. The present control option is the ground application of chemical insecticides, but this tactic is not appropriate for scattered and inaccessible hemlocks, nor hemlocks in riparian areas. Biological control offers an option for control of HWA in these areas.

METHODS: Collect predators of HWA from Japan, ship predators to a quarantine facility in Connecticut, release predators for establishment, and evaluate the predators for distribution and effectiveness. Work will be undertaken through a cooperative agreement with the Connecticut Agricultural Experiment Station.

PRODUCTS AND DELIVERY DATES:

Extend the natural enemy complex for the HWA and monitor the effect on damage caused by this pest species.

Delivery date: December 1996.

START/END DATES: October 1994 - December 1996

COOPERATORS: Mark McClure, Connecticut Agricultural Experiment Station; Dennis Souto, USDA Forest Service-FHP; Michael Montgomery, NE Forest Experiment Station.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon

1 week

Funding

\$75,000 (from FY95 funds)

PROJECT NO.: K17

PROJECT NAME: Management of NAPIAP

LEADER: Impacts and Pesticides Program Manager

LEADER ROLE: Cooperate, coordinate, facilitate, and provide oversight.

PROJECT OBJECTIVE: To administer the Forest Service segment of the National Agricultural Pesticide Impact Assessment Program (NAPIAP).

BACKGROUND/RATIONALE: NAPIAP was established in 1976. It involves five agencies within the USDA (Extension Service, Cooperative State Research Service, Economic Research Service, Agricultural Research Service, and the Forest Service), and maintains a strong partnership with the state land grant universities. The mission of NAPIAP is to promote informed regulatory decisions concerning registered pesticides. The Forest Service segment of NAPIAP has always been administered by the WO-FHP. Due to restructuring of the WO and downsizing of the WO-FHP staff, this function was transferred to FHTET-Morgantown beginning in FY 1996.

METHODS: FHTET-Morgantown will coordinate with WO-FHP to develop and send out the call letter for the FY96 project cycle. To evaluate the proposals, a standing panel will be appointed. This panel will be convened to rate the 1996 proposals and provide those ratings to WO-FHP for final approval. Morgantown will obtain all historic records of the program and work with FHTET-FC to develop and update the NAPIAP database (Projects B1 and B5). Morgantown will also produce all correspondence relative to the program, maintain contact with Regional and Area program coordinators to monitor progress, and summarize and report program accomplishments annually.

PRODUCTS AND DELIVERY DATES:

Call letter for project proposals issued	August, annually
Standing panel members designated	December, annually
Funding recommendations to Director	January, annually
Award letters for Director's approval and signature	February, annually
Project award records inserted in database	March, annually
Program accomplishment report	October, annually

START/END DATES: Ongoing.

COOPERATORS: Gary Smith, WO-FHP; Regional/Area NAPIAP Coordinators, Judy Adams, FHTET-FC.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Impacts and Pesticides PM	12 weeks
Bullard	4 weeks
Funding	\$5,000 (travel)

PROJECT NO.: K18

PROJECT NAME: Silvicultural Prescriptions for Managing Gypsy Moth Populations

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: To determine the relative efficacy of selected silvicultural and insecticide options for managing gypsy moth impacts to forest stands.

BACKGROUND/RATIONALE: Silvicultural prescriptions have been developed for protection of forest stands threatened by the gypsy moth. The AIPM Program initiated efforts to locate and implement these prescriptions on plots within the George Washington and Jefferson National Forests. Gypsy moth populations have been monitored in these stands and populations are building.

METHODS: Approximately 30 stands received the silvicultural prescriptions, with additional stands located as untreated controls or for insecticide treatments.

PRODUCTS AND DELIVERY DATES:

Silvicultural prescriptions

September 1997

START/END DATES: October 1993 - September 1997

COOPERATORS: Russ MacFarlane, George Washington National Forest; Jeff Witcosky, Forest Health; Kurt Gottschalk, FIDR-Morgantown.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$8,000 (R-8, FH)
	\$8,000 (FHTET-M)

PROJECT NO.: K19

PROJECT NAME: Develop Semiochemicals for Operational Use

LEADER: Reardon

LEADER ROLE: Cooperate, coordinate, facilitate, provide oversight.

PROJECT OBJECTIVE: To evaluate the suitability of prototype microsp sponge (Biosys, Inc.) and microcapsule (Concept, Inc.) formulations of racemic disparlure for managing low-density, building gypsy moth populations.

BACKGROUND/RATIONALE: The current commercially produced time-release formulations of racemic disparlure are aerially-applied using specialized equipment, whereas the microsp sponge's and microcapsules require standard boom and nozzle systems.

METHODS: Conduct a series of evaluations of both formulations: pheromone release rate studies in the laboratory; sprayability and stickability of the formulations in spray tower, ground, and aerial application tests; and efficacy trials.

PRODUCTS AND DELIVERY DATES:

Operational time release commercial formulation containing
racemic disparlure.

December 1997

START/END DATES: October 1996 - December 1997

COOPERATORS: Barbary Leonhardt, Insect Chemical Ecology Lab; Vic Mastro and Win McLane, USDA-APHIS; Donna Leonard, USDA Forest Service-FH.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$30,000 (FHTET-M)
	\$15,000 (R-8, FH)

PROJECT NO.: K20

PROJECT NAME: Swath Kit: Support for Cooperative Suppression and Eradication Programs

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: 1) To provide on-line technical assistance concerning the maintenance and upgrades of hardware/software for Swath Kits; 2) to upgrade the hardware in existing Swath Kits to enable the Windows operating system to be run and to give instruction on the new Windows version of the Swath Kit; 3) to organize an annual course in Swath Kit use in aircraft characterization methods; 4) to continue to publish the Swath Kit Newsletter, a monthly information newsletter giving news, advice, and technical bulletins on the subject; and 5) to construct an Internet World Wide Web site as a repository of information on the Swath Kit.

BACKGROUND/RATIONALE: The hardware/software technology for the Swath Kit is constantly being upgraded, and this information needs to be transferred to users via courses, site visits and the newsletter.

METHODS: An annual training course is held at Pennsylvania State University. Steve Maczuga conducts site visits as well as telephone consultations.

PRODUCTS AND DELIVERY DATES:

Annual training course
Consultations

January 1996
is needed.

START/END DATES: October 1995 - September 1996

COOPERATORS: Steve Maczuga, Pennsylvania State University.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$34,000 Northeastern Area

PROJECT NO.: K21

PROJECT NAME: Develop Biological Controls for Suppression of Root Diseases on Conifers in Nurseries

LEADER: Reardon

LEADER ROLE: Coordinate, facilitate, and provide oversight.

PROJECT OBJECTIVE: To coordinate the development of operational biological controls for suppression of root diseases on conifers in nurseries.

BACKGROUND/RATIONALE: Most conifer root diseases caused by soilborne fungi, including *Fusarium spp.*, *Cylindrocladium spp.*, *Pithium spp.*, *Phytophthora spp.*, and *Rhizoctonia solani*. *Fusarium spp.* has been reported as “widespread root rot” and “damping-off pathogens” on most conifers, and caused early seedling mortality in nurseries; *Cylindrocladium spp.* infection and mortality in nurseries and on transplant seedlings has caused nursery beds to be abandoned and nurseries to be closed. Controls of these soilborne pathogenic fungi have depended upon soil fumigation: as the destructive effects of soil fumigation on the ecosystem has increased, development of biological control strategies and techniques for suppression of conifer seedling diseases has become more important. Some biocontrol products originally developed for agricultural crops have shown little effect when used on pathogenic fungi infecting forest seedlings. Biocontrol agents and techniques specifically for use in forest ecosystems need to be developed.

METHODS: Contact representatives of appropriate research/management agencies in order to schedule a meeting. Cooperators will develop a plan that, among other things, lists potential biological control agents for forest nursery diseases and identifies those agents suitable for field trial and/or lab screening. The plan will then be carried out.

PRODUCTS AND DELIVERY DATES:

Operational biological controls for conifer root diseases in nurseries. March 1998

START/END DATES: October 1995 - March 1998

COOPERATORS: Diane Hildebrand, FHP; Cindy Ocamb, North Central Forest Experiment Station; Bob James, Idaho Panhandle NF; Yun Wu, Michigan Technological University.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$20,000

PROJECT NO.: K22

PROJECT NAME: Analysis and Environmental Fate of Insecticides Used to Control Forest Defoliators

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: 1) To develop a method for the extraction and HPLC/electrospray/mass spectrometric analysis of tebufenozide (RH-5992, the active component of MIMIC) from environmental samples; 2) to study the persistence of MIMIC on tree foliage, in underlying ground litter, and in soil in an Ohio forest throughout a growing season and post leaf-fall.

BACKGROUND/RATIONALE: Forest health includes the health of the entire ecosystem. The main goal of insecticide use against forest defoliators is to have the highest impact on the target organism while minimizing impacts on non-target species. These studies will address the environmental fate of certain insecticides known to impact non-target organisms as well as defoliator target species. Knowing where and at what levels the pesticides go after application can help assess impacts to non-target species and efficacy against the target species.

METHODS: The field study and sample storage methods for the MIMIC persistence project will be the same as those for the study of diflubenzuron persistence in the Fernow Experimental Forest: leaves, ground litter, and soil were sampled over time. Laboratory methods are in the development stages to determine the best extraction and concentration procedures prior to HPLC/electrospray/mass spectrometric analysis.

PRODUCTS AND DELIVERY DATES: Techniques to quantify MIMIC levels from field samples (bark, twigs, soil, litter, etc.). Delivery date: February 1997.

START/END DATES: October 1994 - February 1997

COOPERATORS: Mary J. Wimmer, West Virginia University.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$30,000

PROJECT NO.: L1

PROJECT NAME: Non-target Impacts Monitoring Associated with Gypsy Moth Suppression

LEADER: Reardon

LEADER ROLE: Coordinate and provide oversight.

PROJECT OBJECTIVE: To determine the potential long-term impacts of selected insecticides and defoliation on selected non-target terrestrial arthropods, salamanders, and birds associated with broad-leaved forests.

BACKGROUND/RATIONALE: The potential regional impacts on non-target species from insecticide application as part of the cooperative gypsy moth suppression program was identified as a data gap during the preparation of the AIPM and USDA-EIS. Also, data on cumulative effects of insecticide treatments is required as part of the NEPA documentation to support cooperative suppression programs. These data will provide the basis to modify, if necessary, the Federal/State/County cooperative suppression programs and eradication projects.

METHODS: Eighteen plots (each 500 acres) were located on the George Washington and Monongahela National Forests (nine on each Forest). Vegetative mapping and non-target monitoring was conducted within each plot. Preparation of NEPA documentation as well as scoping sessions were initiated. Work will be undertaken through a cooperative agreement with West Virginia University.

PRODUCTS AND DELIVERY DATES:

Provide documentation concerning non-target impacts; if necessary, minimize these impacts by modifying selected aspects of the Federal and State Cooperative Gypsy Moth Suppression program.
Delivery date: December 1999.

START/END DATES: October 1993 - December 1999

COOPERATORS: Linda Butler, West Virginia University; Tom Pauley, Marshall University; Robert Cooper, Memphis State University; Gary Bustamante, USDA Forest Service - Monongahela NF; Jeff Witcosky, USDA Forest Service - George Washington NF.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$250,000

PROJECT NO.: L2

PROJECT NAME: Non-Target Impacts Monitoring Associated with Asian Gypsy Moth Eradication

LEADER: Reardon

LEADER ROLE: Cooperate, coordinate, and facilitate.

PROJECT OBJECTIVE: 1) To quantify non-target impacts on Lepidoptera from the application of *Bacillus thuringiensis* and Gypchek in southeastern North Carolina; and 2) to develop a checklist of Lepidoptera species from southeastern North Carolina that are found in unique habitats and habitats of special concern.

BACKGROUND/RATIONALE: As the gypsy moth expands its range into new and unique habitats, there is an urgent need to document species diversity and non-target species impacts.

METHODS: Establish a series of paired plots (*Bt* and Gypchek) in unique habitats and habitats of special concern within the Asian gypsy moth eradication project area in southeastern North Carolina.

PRODUCTS AND DELIVERY DATES:

List of lepidopteran species associated with unique habitats and habitats of special concern in southeastern North Carolina. These data will be applicable for planning future eradication projects in other southern states. Delivery date: December 1996.

START/END DATES: October 1994 - December 1996

COOPERATORS: J. Bolling Sullivan and Steve Hall, North Carolina Nature Conservancy; Lloyd Garcia, North Carolina Department of Agriculture - Plant Industry Division; Fred Hain, North Carolina State University; Donna Leonard, USDA Forest Service-FHP.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$50,000 (North Carolina Department of Agriculture).

PROJECT NO.: L3

PROJECT NAME: Guidelines for Quantifying Non-target Effects on Lepidoptera in Forested Ecosystems

LEADER: Reardon

LEADER ROLE: Coordinate and facilitate.

PROJECT OBJECTIVE: To establish a set of guidelines which would be implemented as a minimum for all evaluations concerning impacts on non-target species of Lepidoptera in forested ecosystems.

BACKGROUND/RATIONALE: There have been numerous studies conducted to determine the impact of insecticides on non-target Lepidoptera associated with forest ecosystems. Unfortunately, most of these efforts have lacked replication across years, adequate numbers of treatment and control plots, and adequate sampling techniques for lepidopteran larvae and adults. Therefore, it is extremely difficult for managers to review the literature and plan accordingly for operational programs.

METHODS: 1) Interview with specialists (e.g., entomologists, statisticians); 2) review the scientific literature; 3) preparation and review of a draft manual; and 4) publish the manual. This work will be undertaken through a cooperative agreement with Oregon State University.

PRODUCTS AND DELIVERY DATES:

Handbook of guidelines for conducting studies to determine impacts to non-target lepidopteran species for forest ecosystems. Delivery date: December 1996.

START/END DATES: October 1994 - December 1996

COOPERATORS: Jeff Miller, Oregon State University.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$10,000

PROJECT NO.: L4

PROJECT NAME: Development of a Database Concerning Impacts of Biological Insecticides to Non-target Species in Forest Ecosystems

LEADER: Reardon

LEADER ROLE: Cooperate.

PROJECT OBJECTIVE: Develop and maintain an electronically accessible database on the documented non-target impacts of biological insecticides when applied to forest ecosystems.

BACKGROUND/RATIONALE: In recent years, the potential impact of biological insecticides on non-target organisms has become a major factor in the development of operational suppression and eradication programs. These data are not available to most managers.

METHODS: Review existing literature, contact scientists, and obtain data on their current and past projects.

PRODUCTS AND DELIVERY DATES:

An electronic database on non-target impacts with updates scheduled for every 5 years.

Delivery date: September 1996.

START/END DATES: June 1995 - September 1998

COOPERATORS: Steve Holmes, Forestry Canada; David Behmer, Lake Superior State University.

RESOURCE REQUIREMENTS (FHTET-Morgantown):

Reardon	1 week
Funding	\$20,000

RESOURCE MATRICES

FHTET-Fort Collins Resource Requirements

PROJECTS			PERSON WEEKS: FEDERAL												PERSON WEEKS: ON-SITE CONTRACT
ID	Title	Task Leader	JA	BE	GH	PJ	M M	R M	RP	DR	SS	ES	S W		
A1	FHTET Leadership	Eav	8												
A2	FHTET-FC Operations	Eav	2	24	30	4	46	2	6	4	6	2	4	8	
A5	Project 615 Implementation	Roschke							1	8					
A6	Computer System Support	Roschke								4	8				
B1	TDP Program Admin.	Janiga				8								8	
B2	I&D Conditions Rep't & FPIS Supp't	Janiga				2					5		2	18	
B3	Forest Health Highlights	Janiga				3						2		6	
B4	WFHI Tracking System	Janiga				4								6	
B5	NAPIAP Database Support	Adams	2			1								4	
B6	PURS Database Supp't and Rep't	Roschke								2				6	
B7	National Reporting Req's	Pywell							8					20	
B8	DFTM Trap Manuf. & Dist.	Scrivner									6				
C1	Remote Sensing Support	Myhre						12						20	
C2	Aviation Safety & RS Training	Myhre						8						5	
C3	Airborne Video Sys. Users Guide	Myhre						6						15	
C4	Vegetation Cover & Fire Fuels DB	Pywell							1						
C5	Airborne Sensor Eval./Dev.	Pywell						4	8					11	
C6	Automated Mosaicking Dev. & Impl.	Pywell						2	4					8	
C7	Classified Sensor Eval.	Pywell							4						
C8	RS Integration: Dev. and Impl.	Pywell						5	3			2		8	

Notes:

Staff (Federal)

JA = Judy Adams
 BE = Bov Eav
 GH = Georgia Haynes

PJ = Patrice Janiga
 MM = Margaret Means
 RM = Richard Myhre
 RP = Ross Pywell

DR = David Roschke
 SS = Sally Scrivner
 ES = Eric Smith
 SW = Stephen Williams

FHTET-Fort Collins Resource Requirements (cont.)

PROJECTS			PERSON WEEKS: FEDERAL												PERSON WEEKS: ON-SITE CONTRACT
ID	Title	Task Leader	JA	BE	GH	PJ	M M	RM	RP	DR	SS	ES	SW		
D1	Model Maint. & User Supp't	Adams	8								6			20	
D2	PC Distribution of Models	Adams	4							2	2			16	
D3	Model Doc.: RD, WPBR, Initial	Adams	4											19	
D4	Dwarf Mistletoe Training Package	Adams	2								3			6	
D5	Model Users Training	Adams	4											8	
D6	PTIPS Datatbase Support & Recorder	Adams	6											64	
D7	Pest Model Interface Development	Janiga	4			10							8	56	
D8	West-Wide Pine Beetle Model Impl.	Smith	1									6		32	
D9	Multipest Model Dev.	Smith										6		12	
D10	Multiresource Model Supp't	Smith										4		2	
D11	Model Sensitivity, Valid., and Calib.	Smith	3									6		40	
D12	Pest Model Output Display	Pywell				2			5					4	
D13	Biometrics Support	Smith										8		20	
D14	Landscape Assessm't Method.	Williams	1						2			2	14	66	
D15	PTIPS DB Changes to AllVeg	Adams	6												

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FHTET-Fort Collins Resource Requirements (cont.)

PROJECTS			PERSON WEEKS: FEDERAL												PERSON WEEKS: ON-SITE CONTRACT
ID	Title	Task Leader	JA	BE	GH	PJ	M M	RM	RP	DR	SS	ES	SW		
E1	R-8 Forest Health Rulebase Toolkit	Williams											5	13	
E2	INFORMS: Sun to 615	Williams								2			8	30	
E3	Landscape Assessment: INFORMS Integration	Williams											1	12	
E4	Suppose Integration with INFORMS	Williams	2			2							1	8	
E5	GYSES Status Evaluation	Williams											1	5	
E6	DSS Coordination	Janiga				3							1	1	
F1	GIS & Data Visualization Training	Pywell						2	2					8	
F2	SmartForest Implementation (TDP)	Pywell							2	2				8	
G1	Value Research Review	Smith										4		32	
G2	Forest Service Value Analysis	Smith										4		14	
H1	FHTET Communication	Janiga				5				3				24	
H2	Education Certification Prog. Dev.	Myhre						6							
H3	WWW Server Dev.	Roschke								12	4			28	
H4	WWW & Internet Workshop	Roschke								4				2	
H5	FHTET Presentation Graphics	Scrivner	1			1		1	1	1	10	1	1	3	
TOTALS			50	32	30	45	46	48	47	44	50	47	46	696	

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DR = David Roschke

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ES = Eric Smith

SW = Stephen Williams

FHTET-Davis Resource Allocation

PROJECTS			PERSON WEEKS: FEDERAL		
ID	Title	Task Leader	JB	PS	NW
A4	Scope and Operations	Barry			
1	Administration	Whitmire	6	7	34
2	Career Development	Barry	2	2	2
3	FHTET Team Activities	Skyler		5	1
4	FSCBG Model Consultation	Barry	2	4	
5	Information/Library/Newsletters	Barry	1	8	
6	Data Analyses	Barry	1	7	
7	Scientific Publications/Meetings	Barry	4	2	4
8	Steering Committee Meetings	Barry	2		
9	FHTET Management Meetings	Barry	4		
10	Other Meetings	Barry	3	2	2
11	Uncommitted		1		1
11	Vegetation Management	Barry	1		
12	Time/Temperature Effects Study	Barry	7	4	
13	Field Meteorology Handbook	Barry	1		
14	Hardwood Canopy Description	Barry	1		
15	SpraySafe Manager - FSCBG DSS	Barry	4	2	
J1	Dispersion/Fate of Bt	Barry	4		
TOTALS			44	44	44

Notes:

JB = Jack Barry
 PS = Pat Skyler
 NW = Nancy Whitmire

FHTET-Morgantown Resource Allocation

PROJECTS			PERSON WEEKS: FEDERAL			
ID	Title	Task Leader	AB	LC	RR	P M
A1	FHTET Leadership	Bullard	4			
A5	FHTET-Morgantown Operations	Bullard	38	46	6	6
K1	Population Dynamics - Hemlock Wooly Adelgid	Reardon			1	
K2	Inventory of Semiochemicals	Reardon			1	
K3	Inventory of Microbials and Nematodes	Reardon			1	
K4	QA/QC Standards for Semiochemicals	Reardon			1	
K5	Biological Control Survey of Noxious Weeds	Reardon			1	
K6	IPM Program for Common Pine Shoot Beetle	Reardon			2	
K7	Biological Control of Cylindrocladium Root Disease	Reardon			1	
K8	Biological Control of Mile-a-Minute Weed	Reardon			5	
K9	4-AA for Southern Pine Beetle	Reardon			1	
K10	Douglas-fir Tussock Moth Pheromone	Reardon			4	
K11	NPV Application Technology	Reardon			3	
K12	Biological Control of Cypress Aphid in Kenya	Reardon			1	
K13	Cooperative Efforts with ARS, APHIS, IIBC	Reardon			1	
K14	Biological Control of Mealybug in China	Reardon			1	
K15	Biological Control of Woodwasp in Brazil	Reardon			1	
K16	Biological Control of Hemlock Wooly Adelgid	Reardon			1	
K17	Management of NAPIAP	New PM	4			12
K18	Silvicultural Prescriptions for Gypsy Moth	Reardon			1	
K19	Racemic Disparlure Formulation Evaluation	Reardon			1	
K20	Swath Kit Support	Reardon			1	
K21	Biological Control of Root Diseases	Reardon			1	
K22	Environmental Fate Studies	Reardon			1	

Notes:

AB = Allan Bullard
LC = Lisa Cress

RR = Richard Reardon
PM = Program Manager

FHTET-Morgantown Resource Allocation (cont.)

PROJECTS			PERSON WEEKS: FEDERAL			
ID	Title	Task Leader	AB	LC	RR	P M
L1	Non-Target Monitoring for Gypsy Moth Suppression	Reardon			1	
L2	Non-Target Monitoring for Asian Gypsy Moth Eradic.	Reardon			1	
L3	Quantifying Non-Target Lepidoptera Effects	Reardon			1	
L4	Evaluating Exotic Species Non-Target Hosts	Reardon			1	
	TOTALS		46	46	41	18

Notes:

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LC = Lisa Cress

RR = Richard Reardon
PM = Program Manager



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